EPA/ROD/R03-90/104
1990

EPA Superfund
Record of Decision:

DOVER AIR FORCE BASE
EPA ID: DE8570024010
OU 01
DOVER, DE
09/28/1990

Text:

* A PUMP WOULD BE USED TO PUMP THE RESIDUAL WASTE FUEL/OIL FROM THE STRUCTURES.

* THE UNDERGROUND TANKS AND STRUCTURES WILL BE EXCAVATED.

* HIGH TEMPERATURE AND PRESSURIZED STEAM WILL BE USED TO DECONTAMINATE THE STRUCTURES. THE STRUCTURES WILL BE DISPOSED OFF.

* THE LIQUID SLUDGE AND DECONTAMINATION WATER WILL BE TESTED. IF FOUND TO BE A RCRA WASTE REGULATIONS COVERING DISPOSAL OF RCRA LIQUID WASTES WILL BE FOLLOWED. OTHERWISE DELAWARE UST REGULATION GOVERNING DISPOSAL WILL BE FOLLOWED.

AS PART OF THE CONTINUING BASE WIDE STUDY PRESENTLY UNDERWAY AT DOVER AIR FORCE BASE, ANY DEGRADATION IN GROUNDWATER AND SURFACE WATER CAUSED BY THE SITE (IF ANY) WILL BE IDENTIFIED.

DECLARATION OF STATUTORY DETERMINATIONS

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, COMPLIES WITH FEDERAL AND STATE ENVIRONMENTAL LAWS THAT ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO THE REMEDIAL ACTION, AND IS COST-EFFECTIVE. THIS REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT (OR RESOURCE RECOVERY) TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE, AND SATISFIES THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENTS THAT REDUCE TOXICITY, MOBILITY, OR VOLUME AS A PRINCIPAL ELEMENT.

A REVIEW WILL BE CONDUCTED WITHIN FIVE YEARS AFTER COMMENCEMENT OF REMEDIAL ACTION TO ENSURE THAT THE REMEDY CONTINUES TO PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.

EDWIN B. ERICKSON DATE: 09/28/90
REGIONAL ADMINISTRATOR

#SNLD
1. SITE NAME, LOCATION, AND DESCRIPTION

DOVER AIR FORCE BASE

THE DOVER AIR FORCE BASE (DOVER AFB) IS A 3,734-ACRE INSTALLATION LOCATED IN EASTERN DELAWARE, APPROXIMATELY 3.5 MILES SOUTHEAST OF THE CITY OF DOVER, IN KENT COUNTY. FIGURE 1 PRESENTS THE REGIONAL LOCATION OF DOVER AFB, WHICH IS SURROUNDED PRIMARILY BY CROPLAND AND LARGE FARMS. COMMUNITIES IN THE VICINITY OF THE FACILITY INCLUDE THE CITY OF DOVER (DOVER AFB IS WITHIN CITY LIMITS), LITTLE CREEK AND PORT MAHON ANNEX APPROXIMATELY 3 MILES AND 5 MILES RESPECTIVELY TO THE NORTH, AND THE DOVER FAMILY HOUSING ANNEX ADJACENT TO THE FACILITY, AS SHOWN IN FIGURE 2. ROUTES 9 AND 13 RUN NORTHWEST-SOUTHEAST TO THE EAST AND WEST OF THE FACILITY, RESPECTIVELY; ROUTE 8 RUNS EAST-WEST NORTH OF THE FACILITY.

DOVER AFB IS LOCATED ON A RIDGE BETWEEN THE ST. JONES RIVER TO THE SOUTH AND WEST AND LITTLE CREEK TO THE NORTH. BOTH RIVERS FLOW EASTWARD TO THE NEARBY DELAWARE BAY. THE TOPOGRAPHY IS FLAT WITH VERY LITTLE RELIEF. SURFACE ELEVATIONS RANGE FROM 10 FEET MEAN SEA LEVEL (MSL) ALONG THE ST. JONES RIVER SOUTHEAST OF THE BASE TO 30 FEET MSL ALONG THE BASE'S WESTERN BOUNDARY. THE MAXIMUM LOCAL RELIEF IS APPROXIMATELY 12 FEET AT THE ST. JONES RIVER.

DOVER AFB GEOLOGY

DOVER AFB LIES WITHIN THE COASTAL PLAIN PHYSIOGRAPHIC PROVINCE, A REGION UNDERLAIN BY SEDIMENTARY DEPOSITS. THESE DEPOSITS CONSIST OF INTERLAYERS OF GRAVEL, SAND, CLAY, SHALE, LIMESTONE, AND MARL THAT DIP TOWARD THE SOUTHEAST. THEY OVERLIE, AT A GREAT DEPTH, CRYSTALLINE ROCKS THAT CONSIST MAINLY OF MICACEOUS SCHISTS AND GNEISSES OF THE WISSAHICKON FORMATION. THE COASTAL PLAIN SEDIMENTS BELONG TO DIFFERENT FORMATIONS, INCLUDING THE COLUMBIA AT THE SURFACE, THE KIRKWOOD, AND OTHER TERTIARY AND CRETACEOUS SOILS.

THE COLUMBIA SEDIMENTS CONSIST OF INTERLAYERS OF GRAVEL, SAND, SILT, AND CLAY. THEY WERE DEPOSITED IN STREAM CHANNELS, FLOOD PLAINS, AND ASSOCIATED ENVIRONMENTS. FROM THE KENT-NEW CASTLE COUNTY LINE SOUTH, THE COLUMBIA SEDIMENTS CONSIST OF A SAND LAYER THAT THICKENS SOUTHWARD ACROSS KENT AND SUSSEX COUNTIES. THE COLOR OF THESE SANDS RANGES FORM RED-BROWN TO DUSTY RED DEPENDING ON THE AMOUNT OF IRON PRESENT IN THE SANDS. IN THE VICINITY OF THE CITY OF DOVER THERE IS A TRANSITION FROM PREDOMINANTLY FLUVIAL SEDIMENTS TO MARINE SEDIMENTS, WHICH IS EVIDENCED BY CHANGES IN COLOR AND SORTING. THEREFORE, THE COLUMBIA DEPOSITS ARE DISTINGUISHABLE FROM THE UNDERLYING GRAY-BLACK KIRKWOOD FORMATION. THE KIRKWOOD FORMATION, WHICH IS OF MIOCENE AGE, WAS FOUND TO CONSIST OF DARK GRAY, HARD, SILTY CLAY THAT CONTAINS TRACES OF FINE SAND AND SILT. THE TOP OF THIS FORMATION WAS ENCOUNTERED BETWEEN -8 AND -43 MSL (SAIC, 1989).

DOVER AFB GROUNDWATER

THE CHESWOLD AND PINEY POINT AQUIFERS ARE THE PRIMARY WATER SUPPLY AQUIFERS IN THE DOVER AREA. THE CHESWOLD IS COMPOSED OF FINE-TO-COARSE SAND WITH SHELLS AND IS 50 TO 75 FEET THICK IN THE DOVER AREA. THE PINEY POINT AQUIFER CONSISTS OF FINE-TO-MEDIUM GLAUCONITIC SAND AND IS SEPARATED FROM THE CHESWOLD AQUIFER BY A THICK, SILTY SAND CONFINING UNIT.

THE COLUMBIA AQUIFER CONSISTS OF FINE-TO-COARSE SAND WITH DISCONTINUOUS INTERLAYERS OF CLAY AND GRAVEL. PUBLISHED DATA INDICATE THAT THE AVERAGE HYDRAULIC CONDUCTIVITY FOR THIS AQUIFER IN CENTRAL AND SOUTHERN DELAWARE IS ABOUT 3.1 X (10-3) CENTIMETERS PER SECOND (CM/SEC) AND THAT A SPECIFIC YIELD OF 0.15 IS CONSIDERED REPRESENTATIVE FOR THIS AQUIFER (SAIC, 1989). THE GROUNDWATER TABLE IS SHALLOW, AND GROUNDWATER IN SOME

LOCATIONS TRAVELS FAIRLY SHORT DISTANCES BEFORE DISCHARGING INTO NEARBY SURFACE WATERS.

THE CHESWOLD AND PINEY POINT AQUIFERS PROVIDE APPROXIMATELY 80 PERCENT OF THE TOTAL MUNICIPAL AND INDUSTRIAL WATER PUMPED IN KENT COUNTY (LEAHY, 1982). BY CONTRAST, PUMPING FROM THE COLUMBIA AQUIFER IS MINOR (JOHNSTON, 1977) AND THE WATER IS USED PRIMARILY FOR IRRIGATION AND DOMESTIC SUPPLY. HOWEVER, BECAUSE THE COLUMBIA IS EASILY ACCESSIBLE AND CAN PROVIDE LARGE QUANTITIES OF WATER, IT IS AMONG THE MOST IMPORTANT STATEWIDE GROUNDWATER RESOURCES. ACCORDING TO SUNDSTROM (1968), THE FREDERICA AND OVERLYING MIOCENE SANDS SUPPLY THE TOWNS OF FELTON, FREDERICA, HARRINGTON, AND MILFORD, AS WELL AS SEVERAL FOOD PROCESSING AND POULTRY INDUSTRIES. THE FREDERICA IS NOT USED TO SUPPLY WATER IN THE DOVER AFB AREA. SEVERAL PRODUCTION WELLS THAT TAP THESE DEEPER AQUIFERS ARE LOCATED AT DOVER AFB. THREE OF THESE WELLS ARE SCREENED IN THE CHESWOLD AQUIFER BETWEEN -188 AND -268 FEET MSL. THE OTHER FOUR PRODUCTION WELLS TAP THE PINEY POINT AQUIFER AND ARE SCREENED AT APPROXIMATELY -450 TO -560 FEET MSL.

DOVER AFB SURFACEWATER

THE HIGHEST ELEVATION (18 FEET MSL) ALONG THE SOUTHEAST-NORTHWEST RUNWAY MARKS THE LOCATION OF A DRAINAGE DIVIDE ON DOVER AFB. FIGURE 3 PRESENTS INSTALLATION SURFACE DRAINAGE PATTERNS. SURFACE RUNOFF AT THE BASE IS MOSTLY TO THE NORTH AND SOUTH. THE AREAS NORTH OF THE DIVIDE DRAIN INTO THE SMALL STREAMS THAT FEED (OFFBASE) INTO THE MORGAN AND PIPE ELM BRANCHES, WHICH IN TURN FLOW NORTHEAST TO LITTLE CREEK. THE AREAS SOUTH OF THE DIVIDE DRAIN INTO THE SMALL TRIBUTARIES OF THE ST. JONES RIVER. BOTH THE LITTLE CREEK AND ST. JONES RIVER FLOW EASTWARD TO THE DELAWARE BAY.

ONBASE RUNOFF AND NONPROCESS WATERS ARE DISCHARGED TO SEVERAL SURFACE WATER DIVERSIONS (I.E., OPEN DITCHES). IN AREAS WHERE THE ELEVATION OF THE BOTTOM OF THE DIVERSIONS IS HIGHER THAN THE WATER TABLE, SURFACE WATERS MAY INFILTRATE AND RECHARGE GROUNDWATER. HOWEVER, IN AREAS WHERE THE DIVERSIONS AND/OR ON-BASE STREAMS HAVE CUT BELOW THE LEVEL OF THE WATER TABLE, GROUNDWATER APPEARS TO DISCHARGE INTO THOSE DIVERSIONS AND STREAMS.

SURFACE WATER FLOW IS GENERALLY IN THE SAME DIRECTION AS GROUNDWATER IN AREAS UNDERLAIN BY THE COLUMBIA FORMATION, WHICH FORMS A WATER TABLE AQUIFER UNDER THE REGION. A GROUNDWATER DIVIDE ROUGHLY COINCIDES WITH THE TOPOGRAPHIC DIVIDE (SOUTHEAST-NORTHWEST RUNWAY) OF DOVER AFB. IN GENERAL, GROUNDWATER IN THE NORTHEAST PORTION OF DOVER AFB FLOWS NORTH TOWARD MORGAN AND PIPE ELM BRANCHES, AND IN THE SOUTHWEST PORTION OF DOVER AFB FLOWS SOUTH TOWARD ST. JONES RIVER AND ITS TRIBUTARIES.

THE WATER TABLE ELEVATIONS AT DOVER AFB (FIGURE 4) INDICATE THAT THE GRADIENTS SOUTH OF THE DIVIDE ARE GREATER THAN THE GRADIENTS TO THE NORTH. MINIMAL OR NO GROUNDWATER MOVEMENT IS SHOWN TO OCCUR BENEATH THE RUNWAYS AT DOVER AFB. THIS LACK OF GROUNDWATER MOVEMENT IS ATTRIBUTED TO THE LARGE SURFACE AREAS OCCUPIED BY THE RUNWAYS, WHICH AFFECT THE INFILTRATION OF RAINFALL AND CONSEQUENTLY THE RECHARGING OF THE WATER TABLE IN THE CENTRAL PORTION OF DOVER AFB.

DOVER AFB DEMOGRAPHIC INFORMATION

DOVER AFB HAS TWO RUNWAYS AND ABOUT 1,700 BUILDINGS. IT EMPLOYS APPROXIMATELY 5,000 MILITARY PERSONNEL AND OVER 1,400 CIVILIANS.

LANDS ADJACENT TO DOVER AFB INCLUDE SINGLE AND MULTIFAMILY RESIDENTIAL AREAS, INDUSTRIAL ZONES, COMMERCIAL LAND ALONG MAJOR ROADS, AND LARGE AREAS OF AGRICULTURAL AND OPEN LANDS. THE LARGE RESIDENTIAL AREAS ARE LOCATED ACROSS US ROUTE 113 FOR BASE PERSONNEL AND GENERALLY SOUTHWEST

OF THE BASE, ACROSS THE ST. JONES RIVER. NUMEROUS LOW-DENSITY SINGLE FAMILY HOMES ARE SCATTERED THROUGHOUT THE AREA AROUND THE BASE. MAJOR INDUSTRIAL AREAS ARE LOCATED TO THE NORTH OF DOVER AFB, AND COMMERCIAL AREAS ARE LOCATED ALONG MAJOR ROADS TO THE NORTH AND WEST. GOVERNMENT AND INSTITUTIONAL USES INCLUDE SCHOOLS ACROSS FROM THE BASE ON US ROUTE 113, AND NUMEROUS LOCAL, STATE, AND FEDERAL BUILDINGS IN THE CITY OF DOVER. AGRICULTURAL AND OPEN LAND AREAS CAN BE FOUND IN MANY LOCATIONS ALONG THE PERIMETER OF DOVER AFB, ESPECIALLY TO THE SOUTH AND EAST.

DOVER AFB WILDLIFE USES AND WETLANDS

DOVER AFB HAS LIMITED HABITAT AVAILABLE FOR WILDLIFE. THE WILDLIFE PRESENT ON BASE CONSISTS OF SMALL MAMMALS AND BIRDS AND AN OCCASIONAL WHITE-TAILED DEER. THERE ARE NO THREATENED OR ENDANGERED ANIMAL OR PLANT SPECIES ON BASE, AND GAME HUNTING IS NOT ALLOWED.

THE DEPARTMENT OF INTERIOR ESTIMATES THAT DELAWARE HAS OVER 220,000 ACRES OF WETLANDS; 23 PERCENT OF KENT COUNTY IS ESTIMATED TO CONSIST OF WETLAND AREAS. WETLANDS PLAY A CRITICAL ROLE IN THE HYDROLOGIC CYCLE AND HAVE A VARIETY OF ECOLOGICAL AND SOCIAL BENEFITS THAT HAVE LED TO THEIR INCREASING PROTECTION BY THE US GOVERNMENT, AS WELL AS THE STATE OF DELAWARE. AS PART OF THE FEDERAL GOVERNMENT'S PROGRAM TO PRESERVE AND ENHANCE THE NATION'S WETLANDS, THE NATIONAL WETLANDS INVENTORY (NWI) PROJECT HAS DEVELOPED GENERALIZED (1:24000 SCALE) MAPS OF WETLAND TYPES. WETLANDS IN THE VICINITY OF THE FIRE TRAINING AREA #3 ARE DISCUSSED BELOW.

FIRE TRAINING AREA #3

FIRE TRAINING AREA #3 (SITE FT-3) IS LOCATED IN THE NORTHEASTERN PORTION OF DOVER AFB, AND TO THE EAST OF THE NORTH-SOUTH AIRFIELD RUNWAY, AS SHOWN IN FIGURE 5. SITUATED APPROXIMATELY 800 FEET FROM THE INSTALLATION BOUNDARY, IT IS ADJACENT TO A TRIBUTARY OF LITTLE CREEK. THE PORTION OF THE SITE THAT IS CURRENTLY INACTIVE--COVERING APPROXIMATELY 1.3 ACRES--SERVED AS THE MOST RECENT FIRE TRAINING AREA, FROM 1962 TO 1989. A SQUARE, UNLINED AREA (PIT) OF UNKNOWN SIZE--ADJACENT TO THE TRIBUTARY--WAS FORMERLY USED FOR TRAINING FROM 1962 TO EARLY 1970 (FIGURE 6).

SITE FT-3 GEOLOGY

EVALUATION OF THE SUBSURFACE INFORMATION OBTAINED DURING THE FIELD INVESTIGATION (SAIC, 1989) INDICATES THAT THE CENTRAL PORTION OF THE SITE IS UNDERLAIN BY A LAYER OF FILL MATERIAL COMPRISED OF A MIXTURE OF SILT, SAND, AND CLAY. IT APPEARS THAT THE FILL, WHICH IS 4 TO 6 FEET THICK, IS COMPOSED OF ONSITE SOILS AND WAS BUILT DURING THE CONSTRUCTION OF THE EXISTING FIRE TRAINING AREA AND BURIAL OF THE PREVIOUS FIRE TRAINING AREA. UNDER THE FILL AND GROUND SURFACE AT THE OTHER LOCATIONS OF THE SITE, THE BORINGS ENCOUNTERED THE UNCONSOLIDATED MATERIAL OF THE COLUMBIA FORMATION, WHICH RANGES IN THICKNESS FROM 50 FEET IN THE WESTERN PORTION OF THE SITE (WELL MW-44D) TO 40 FEET IN THE EASTERN PORTION (WELL MW-20). THE MATERIAL CONSISTS PRIMARILY OF FINE-TO-MEDIUM SAND THAT GRADES WITH DEPTH TO COARSE SAND, AND INCLUDES LOCALIZED LAYERS OF SILT, CLAY, AND GRAVEL. A CLAY LAYER THAT IS 8 TO 10 FEET THICK WAS ENCOUNTERED THROUGHOUT MUCH OF THE SITE AT A DEPTH RANGING FROM THE GROUND SURFACE AT WELL MW-20 TO 5.5 FEET BELOW GROUND SURFACE AT WELL MW-19. LOCALIZED LENSES OF GRAVEL RANGING IN THICKNESS FROM 3 TO 5 FEET WERE ENCOUNTERED IN SEVERAL OF THE BORINGS; HOWEVER, THEY APPEAR TO BE LATERALLY DISCONTINUOUS.

UNDERLYING THE UNCONSOLIDATED MATERIAL OF THE COLUMBIA FORMATION ARE MOSTLY DARK GRAY CLAY LAYERS OF THE KIRKWOOD FORMATION. THE UPPER FEW FEET OF THE KIRKWOOD WERE PENETRATED BY ALL FIVE BOREHOLES USED TO INSTALL THE DEEP MONITORING WELLS. THE COLUMBIA/KIRKWOOD FORMATION

INTERFACE BENEATH SITE FT-3 RANGES IN ELEVATION FROM APPROXIMATELY -28 FEET MSL IN THE SOUTHWESTERN PORTION OF THE SITE TO -32 FEET MSL IN THE NORTHERN PORTION.

SITE FT-3 GROUNDWATER

GROUNDWATER AT SITE FT-3 IS FOUND WITHIN THE COLUMBIA AQUIFER AT A SHALLOW DEPTH RANGING FROM ABOUT 4 TO 11 FEET BELOW GROUND SURFACE. TABLE 1 PRESENTS GROUNDWATER MEASUREMENTS IN THE MONITORING WELLS OF SITE FT-3 THAT WERE TAKEN IN JANUARY, JUNE, AND JULY OF 1988. AS SHOWN IN THE TABLE, THE WATER TABLE ELEVATIONS VARIED SLIGHTLY WITH THE CHANGE IN SEASONS, WITH THE HIGHEST LEVELS RECORDED IN THE SPRING. THE GROUNDWATER FLOW DIRECTION IS GENERALLY NORTHEAST AT A GRADIENT OF APPROXIMATELY 0.46 PERCENT FROM WELL MW-18 TO WELL MW-20, AND 0.23 PERCENT FROM WELL MW-44S TO WELL MW-43S. FIGURE 7 PRESENTS GROUNDWATER ELEVATION CONTOURS AS MEASURED ON JULY 13, 1988. THOSE CONTOURS CONFIRM THE NORTHEASTERLY GROUNDWATER FLOW DIRECTION.

THE SIMILAR GROUNDWATER LEVELS OBSERVED IN EACH PAIR OF DEEP AND SHALLOW WELLS (NOS. 43 AND 44) INDICATE THAT THE COLUMBIA AQUIFER IS HYDRAULICALLY CONNECTED AND THAT THE CLAY LAYERS ENCOUNTERED DURING WELL INSTALLATION DO NOT ACT AS CONFINING LAYERS IN THE AQUIFER. THE SHALLOW GROUNDWATER FLOWS FROM UNDER THE SITE TO THE ADJACENT STREAMS TO THE NORTH.

SITE FT-3 SURFACEWATER AND WETLANDS

THE GROUND SURFACE AT SITE FT-3 IS MAINLY FLAT--SLOPING GENTLY TO THE NORTH AND EAST--WITH ELEVATIONS RANGING FROM ABOUT 20 TO 12 FEET MSL. THE MAJOR TOPOGRAPHIC FEATURE IN THE VICINITY OF THE SITE IS THE STREAM VALLEY CONTAINING PIPE ELM BRANCH, WHICH FLOWS NORTHEAST TO LITTLE CREEK.

SITE FT-3 IS ADJACENT TO SOME WETLANDS, AS SHOWN IN FIGURE 8. THESE WETLANDS WERE LOCATED USING NWI INFORMATION BASED ON AERIAL PHOTOGRAPHY (SAIC, 1989).

#SHEA
II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

SITE HISTORY

DOVER AFB

DOVER MUNICIPAL AIRFIELD WAS LEASED TO THE US ARMY AIR CORPS IN DECEMBER 1941 AND SERVED AS A BASE FOR DIFFERENT ACTIVITIES UNTIL IT WAS DEACTIVATED IN SEPTEMBER 1946. DURING THAT PERIOD, THE BASE SERVED ONE OR MORE FUNCTIONS--A COASTAL PATROL BASE, A LOGISTIC AND MAINTENANCE SUPPORT FACILITY FOR US AIR FORCE UNITS, AN OPERATIONAL TRAINING BASE, A SITE FOR THE DEVELOPMENT OF AIR-LAUNCHED ROCKETS, AND A PRE-SEPARATION PROCESSING CENTER FOR PERSONNEL LEAVING THE SERVICE AT THE END OF WORLD WAR II.

THE BASE WAS PERIODICALLY USED BY THE AIR NATIONAL GUARD FOR TRAINING EXERCISES DURING THE TIME OF DEACTIVATION. THE BASE WAS REACTIVATED AND DESIGNATED AS DOVER AIR FORCE BASE IN JULY 1950. IN MARCH 1952, ACCOMPANYING A TRANSFER OF COMMAND TO THE MILITARY AIR TRANSPORT SERVICE (NOW MILITARY AIRLIFT COMMAND), THE BASE MISSION SWITCHED FROM AIR AND LAND DEFENSE TO CARGO OPERATIONS, WHICH ARE CURRENTLY THE MAIN OPERATIONS AT DOVER AFB.

HAZARDOUS WASTES GENERATED AT DOVER AFB RESULT FROM INDUSTRIAL OPERATIONS, FUELS MANAGEMENT, FIRE TRAINING, AND PESTICIDE USE. THE WASTES INCLUDE WASTE FUELS, OILS AND SOLVENTS, EMPTY PESTICIDE

CONTAINERS, TRANSFORMERS CONTAINING POLYCHLORINATED BIPHENYLS (PCBS), WASTEWATERS FROM INDUSTRIAL SHOPS, AND EXCESS PAINTS.

HAZARDOUS WASTES HAVE BEEN HANDLED IN VARIOUS MANNERS AT THE BASE SINCE 1941. FROM 1941 THROUGH 1963, LANDFILLS AND/OR PITS LOCATED ALONG THE PERIMETER OF THE BASE WERE USED AS DISPOSAL SITES FOR OILS, PAINT, HYDRAULIC FLUID, AND SOLVENTS; COMBUSTIBLE CHEMICALS SUCH AS OILS, FUELS, AND SOLVENTS WERE USED AT FIRE TRAINING AREAS IN ROUTINE FIRE TRAINING EXERCISES; AND WASTEWATER FROM INDUSTRIAL SHOPS, SUCH AS THE ENGINE BUILDUP SHOP AND THE PLATING SHOP, WERE DISCHARGED TO A STORM DRAINAGE DITCH THAT EMPTIED INTO A TRIBUTARY OF LITTLE CREEK.

FROM 1963 THROUGH 1968, AN INDUSTRIAL WASTE COLLECTION SYSTEM WAS USED TO COLLECT WASTE OILS, SOLVENTS, AND CONTAMINATED FUELS FOR RECYCLING OR USE IN FIRE TRAINING EXERCISES. HOWEVER, THE UNTREATED WASTES OF THE PLATING SHOP CONTINUED TO BE DISCHARGED INTO THE STORM DRAINAGE DITCH DURING THIS PERIOD. IN 1968, THE INDUSTRIAL WASTE COLLECTION SYSTEM WAS ENLARGED TO INCLUDE THE COLLECTION OF WASTES GENERATED BY THE PLATING SHOP. FROM 1981 UNTIL THE PRESENT TIME, THE DIFFERENT WASTES GENERATED AT THE BASE HAVE BEEN DISPOSED OF OFFBASE USING APPROVED PROCEDURES. JP-4 FUEL WAS THE ONLY WASTE USED FOR ON-BASE FIRE TRAINING AFTER 1975; HOWEVER, FIRE TRAINING EXERCISES CEASED IN MAY 1989.

SITE FT-3

FROM 1962 THROUGH EARLY 1970, CONTAMINATED WASTE OILS AND FUELS WERE EITHER PLACED ON AN OLD AIRCRAFT THAT WAS BROUGHT TO THE SITE FOR TRAINING EXERCISES, OR SPREAD IN THE WATER-SATURATED FORMER PIT AND

IGNITED TWICE PER WEEK. DRUMS OF WASTE OIL AND FUELS ORIGINATING FROM SHOP OPERATIONS WERE STORED NEAR THE SITE AND USED AS THE SOURCE OF FUEL FOR FIRE TRAINING EXERCISES. AT LEAST 1,000 GALLONS OF WASTE OIL AND FUEL WERE NORMALLY USED PER EXERCISE; HOWEVER, IF MORE WASTE WAS AVAILABLE, IT WAS ALSO BURNED. BASED ON CHEMICAL TESTS PERFORMED ON SOIL SAMPLES TAKEN FROM THE SITE DURING THE US AIR FORCE'S INSTALLATION RESTORATION PROGRAM PHASE II, STAGE 2 INVESTIGATION (SAIC, 1989), IT APPEARS THAT THIS PIT WAS CLOSED BY COVERING IT WITH 6 TO 8 FEET OF SOIL.

A NEW CIRCULAR PIT WITH A 12-INCH BERM AROUND IT WAS BUILT TO THE SOUTHWEST OF THE SQUARE PIT IN EARLY 1970; THIS PIT WAS USED UNTIL 1989 AS THE FIRE TRAINING AREA AT DOVER AFB. DURING THIS PERIOD, THE TRAINING EXERCISES WERE LIMITED TO ONCE PER QUARTER AND USED ONLY OFF-SPECIFICATION JP-4 AS FUEL. UNCONSUMED FUEL, WATER, AND AQUEOUS FILM FORMING FOAM, WHICH WAS USED TO EXTINGUISH THE FIRES, WERE DRAINED TO AN UNDERGROUND OIL/WATER SEPARATOR THAT WAS INSTALLED AT THE SITE IN THE EARLY 1970S. OIL WAS THEN COLLECTED PERIODICALLY BY A CONTRACTOR FOR REUSE AND RECOVERY. IT ALSO HAS BEEN DETERMINED THAT AN UNDERGROUND STORAGE TANK (UST) EXISTS NEAR THIS NEW PIT THAT WAS USED TO STORE JP-4 FOR THE TRAINING EXERCISES. THE SIZE OF THE UST IS UNKNOWN; IT IS ASSUMED TO BE LOCATED AT THE NORTHWEST CORNER OF THE SITE. OTHER ONSITE STRUCTURES INCLUDE UNDERGROUND PIPES AND 20 CLOSELY SPACED DUMPSTERS THAT WERE PLACED INSIDE THE CIRCULAR PIT. THE DUMPSTERS USED TO BE SPRAYED WITH JP-4 AND IGNITED TO SIMULATE AN AIRPLANE ON FIRE FOR TRAINING EXERCISES.

ENFORCEMENT ACTIVITIES

THE AIR FORCE, EPA, AND DNREC SIGNED A FEDERAL FACILITY AGREEMENT ON JUNE 29, 1989, PURSUANT TO SECTION 120 OF CERCLA, WHICH PROVIDES FOR THE OVERSIGHT AND ENFORCEMENT OF AIR FORCE REMEDIAL ACTION AT THE DOVER AFB. EPA ISSUED A RCRA CORRECTIVE ACTION PERMIT WHICH DEFERS CORRECTIVE ACTION UNDER RCRA TO IMPLEMENTATION OF REMEDIAL ACTIONS UNDER THE FEDERAL FACILITY AGREEMENT.

#HCP
III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

THE REMEDIAL INVESTIGATION/FOCUSSED FEASIBILITY STUDY (RI/FFS), PROPOSED REMEDIAL ACTION PLAN (RAP), AND BACKGROUND DOCUMENTATION FOR SITE FT-3, WERE RELEASED TO THE PUBLIC FOR COMMENT IN AUGUST 1990. THESE DOCUMENTS WERE MADE AVAILABLE TO THE PUBLIC IN THE LOCAL INFORMATION AND ADMINISTRATIVE RECORD REPOSITORY AT THE DOVER PUBLIC LIBRARY, DOVER, DELAWARE. THE NOTICE OF AVAILABILITY FOR THESE DOCUMENTS WAS PUBLISHED IN THE NEWS JOURNAL AND THE DELAWARE STATE NEWS ON TUESDAY AUGUST 14, 1990. A PUBLIC COMMENT PERIOD ON THE DOCUMENTS WAS HELD FROM AUGUST 14, 1990 TO SEPTEMBER 27, 1990. ADDITIONALLY, A PUBLIC MEETING WAS HELD AT 7:00 P.M. ON AUGUST 30, 1990, AT THE DOVER AFB OFFICER'S CLUB. AT THIS MEETING, REPRESENTATIVES FROM THE AIR FORCE, EPA, AND DNREC ANSWERED QUESTIONS ABOUT SITE FT-3 AND THE REMEDIAL ALTERNATIVES UNDER CONSIDERATION. A RESPONSE TO THE COMMENTS RECEIVED DURING THIS PERIOD IS INCLUDED IN THE RESPONSIVENESS SUMMARY, WHICH IS PROVIDED IN SECTION XI OF THIS RECORD OF DECISION (ROD). THE RESPONSIVENESS SUMMARY IS BASED ON ORAL AND WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD. THE ABOVE ACTIONS SATISFY THE REQUIREMENTS OF SECTIONS 113(K) AND 117 OF CERCLA, 42 USC. SECTIONS 9613(K) AND 9617. THE DECISION FOR THIS SITE IS BASED ON THE ADMINISTRATIVE RECORD.

#SROU
IV. SCOPE AND ROLE OF OPERABLE UNIT

AS WITH MANY SUPERFUND SITES, THE PROBLEMS AT THE DOVER AFB ARE COMPLEX. AS A RESULT, THE AIR FORCE HAS ORGANIZED THE REMEDIAL WORK INTO OPERABLE UNITS. THIS ROD ADDRESSES THE FIRST PLANNED REMEDIAL ACTION AT THE BASE. THE AIR FORCE IS CONTINUING WITH THE DOVER AFB-WIDE STUDY THAT WILL DETERMINE THE NEXT OPERABLE UNITS TO BE REMEDIATED.

THE OPERABLE UNIT AUTHORIZED BY THIS ROD ADDRESSES THE CONTAMINATED SOILS AND STRUCTURES AT SITE FT-3. THIS ROD ADDRESSES RISKS FROM THIS AREA, INCLUDING THE RISK FROM DERMAL CONTACT AND ACCIDENTAL INGESTION, AND THE POTENTIAL FOR CONTAMINANTS TO MIGRATE TO GROUNDWATER. GROUNDWATER AND THE ADJACENT DRAINAGE DITCH THAT LEADS TO PIPE ELM BRANCH WILL BE INVESTIGATED AS PART OF THE DOVER AFB AREA-WIDE STUDY, AND WILL BE ADDRESSED IN A SUBSEQUENT ROD. FURTHER, SOILS IMMEDIATELY SURROUNDING THE UST WERE NOT TESTED DURING THE INVESTIGATION. THEREFORE UPON IMPLEMENTATION OF THE REMEDY CHOSEN BY THIS ROD, THESE SOILS WILL BE TESTED. IF THE ANALYSIS INDICATES SOIL CONTAMINATION IN EXCESS OF LEVELS PREVIOUSLY DETECTED, A SUBSEQUENT RISK ASSESSMENT WILL BE PERFORMED.

#SSC
V. SUMMARY OF SITE CHARACTERISTICS

WHILE THIS ROD FOCUSES ON THE POTENTIAL REMEDIATION OF SOIL AND STRUCTURES AT SITE FT-3, THE DISCUSSION OF CONTAMINATION INCLUDES ALL MEDIA INVESTIGATED (I.E., SOIL, STRUCTURES, GROUNDWATER, SURFACE WATER, AND SEDIMENT). DISCUSSING CONTAMINATION IN A BROADER CONTEXT PROVIDES A MORE COMPREHENSIVE ENVIRONMENTAL FRAMEWORK UPON WHICH TO BASE DECISIONS ON REMEDIATION. TABLE 2 PRESENTS CONTAMINANTS DETECTED IN SITE FT-3 SOILS AND GROUNDWATER.

SITE FT-3 SOIL AND STRUCTURES

FIGURE 9 IS REPRESENTATION OF SITE FT-3 AND SHOWS THE LOCATIONS OF PRESENT AND FORMER FIRE TRAINING PITS, THE LOCATION OF SOIL BORINGS, AND THE TPH CONCENTRATIONS (WITH ISOCONCENTRATION CONTOURS) IN SOIL AT EACH

BORING IN DESCENDING ORDER OF DEPTH. FIGURE 10 SHOWS THE TOTAL PETROLEUM HYDROCARBONS (TPH) SOIL ISOCONCENTRATION CONTOURS ALONG WITH THE LOCATION OF THE ADJACENT WETLANDS (ILLUSTRATED IN FIGURE 8). A TOTAL OF 14 BORINGS WERE DRILLED IN AND AROUND THE STUDY SITE. FOUR OF THESE BORINGS (D9 THROUGH D12) WERE LOCATED ALONG TWO STREAM CHANNELS--PIPE ELM BRANCH TO THE NORTH AND AN UNNAMED INTERMITTENT STREAM TO THE NORTHEAST. SAMPLES WERE TAKEN AT INTERVALS BELOW THE GROUND SURFACE AT 1 TO 3, 4 TO 6, AND 7 TO 9 FEET. IN ADDITION, 10 BORINGS (D30 THROUGH D48) THAT FAN OUT FROM THE CURRENT PIT WERE SAMPLED AT 0 TO 2, 2 TO 4, 4 TO 6, AND 6 TO 8 FEET BELOW GROUND SURFACE.

THE SOILS WERE ANALYZED FOR VOLATILE ORGANIC COMPOUNDS (VOCS), LEAD, AND TPH (SAIC, 1989). THE TPH CONCENTRATIONS AT 2 TO 4 FEET BELOW GROUND SURFACE ARE GENERALLY HIGHER AND HAVE GREATER AREAL EXTENT THAN THE LEVELS AT DEPTH. THESE LEVELS ARE CONTOURED IN FIGURE 9 TO SHOW THE EXTENT OF SOIL CONTAMINATION. THE ISOCONCENTRATION CONTOURS WERE DEVELOPED BY SAIC BASED ON AVAILABLE DATA. VARIATIONS BETWEEN THE CONTOURS AND THE ACTUAL TPH CONCENTRATIONS IN SOIL MAY OCCUR DUE TO ISOLATED POCKETS OF CONTAMINATED SOIL ASSUMED TO BE PRESENT AT SITE FT-3.

NOTE THAT THE RESULTS OF SOIL GAS ANALYSES PERFORMED AT SITE FT-3 INDICATE THAT MAXIMUM DETECTIONS OF TPH (FIGURE 11) AND TOLUENE (FIGURE 12) IN THE SOIL GAS DO NOT COINCIDE WITH EACH OTHER OR WITH THE LOCATIONS OF MAXIMUM TPH DETECTIONS IN SOIL (SAIC, 1989). THE MAXIMUM DETECTION OF TPH (GREATER THAN 1,000 PARTS PER BILLION (PPB)) IN SOIL GAS IS LOCATED PARALLEL TO THE PAVED AREA OF THE SITE, EXTENDING FROM THE TAXIWAY AND ADJACENT TO THE SOUTHWEST END OF THE FIRE TRAINING AREA. ANALYSIS OF SOIL NEAR THE SAME LOCATION (SOIL BORING D48) DID NOT DISCLOSE THE PRESENCE OF TPH. IN CONTRAST TO THE RESULTS OF THE SOIL GAS ANALYSES, THE MAXIMUM FOR TPH IN SOIL OCCURS AT SAMPLE LOCATION D44--THE NORTHERN END OF THE FIRE TRAINING AREA. THIS LACK OF COINCIDENT MAXIMA BETWEEN THE SOIL AND SOIL GAS ANALYSES SUGGESTS THAT TPH IN THE SOIL GAS MAY HAVE AN INDEPENDENT SOURCE--PERHAPS NEARBY REFUELING OPERATIONS.

FIGURE 13 LOCATES THE VERTICAL PROFILE OF TPH CONCENTRATIONS DEPICTED IN FIGURE 14. THIS PROFILE WAS DEVELOPED FROM SOIL ANALYSIS DATA FOR TPH (SAIC, 1989), AND SHOWS ONE FEATURE THAT IS NOT CLEARLY DISTINGUISHABLE FROM THE CONTOURING OF TPH CONCENTRATIONS IN SOILS NEAR THE SURFACE. THERE ARE TWO DISTINCT ZONES OF SOIL STRATUM THAT COINCIDE WITH FORMER VERSUS MOST RECENT FIRE TRAINING ACTIVITIES. THE HIGHEST CONCENTRATIONS OF TPH OCCUR IN THE VICINITY OF THE ACTIVE FIRE TRAINING AREA, WHERE RELATIVELY LOW CONCENTRATIONS OF BENZENE, ETHYLBENZENE, TOLUENE, XYLENE, 1,1-DICHLOROETHANE, 1,2-DICHLOROETHENE, AND TRICHLOROETHENE WERE DETECTED IN SAMPLES FROM SOIL BORINGS D43, D44 AND D45 (SAIC, 1989).

A SECOND, DEEPER ZONE OF ELEVATED TPH CONCENTRATION IS ALSO CLEARLY DEFINED IN THE VICINITY OF BORINGS D42 AND D40. AS SHOWN IN FIGURE 14, SOIL BORING D42 LIES WITHIN THE ESTIMATED BOUNDARY OF THE FORMER FIRE TRAINING AREA, AND THE NEARSURFACE SOILS THAT HAVE ELEVATED LEVELS OF TPH (SOIL BORING D40) LIE ON APPROXIMATELY THE SAME HORIZON. IT IS LIKELY THAT THIS HORIZON WAS AT THE LAND SURFACE WHEN THE FORMER PIT WAS IN USE, AND THAT THE TPH LEVELS DETECTED AT THIS HORIZON REPRESENT THE PIT AND ADJACENT AREAS OF SPILLAGE. WHEN THE NEW PIT WAS CONSTRUCTED AND THE OLD ONE CLOSED, THE FORMER FIRE TRAINING AREA WAS BACKFILLED AND GRADED TO ITS PRESENT CONFIGURATION.

TWO ADDITIONAL ORGANIC CHEMICALS 2-BUTANONE AND TETRACHLOROETHENE (PCE)--WERE REPORTED IN THE SOILS AT SITE FT-3 (SAIC, 1989). RELATIVELY LOW CONCENTRATIONS WERE DETECTED IN ONLY TWO SAMPLES. ALL OF THE ORGANIC CHEMICALS REPORTED TO BE AT SITE FT-3 IN THE IRP PHASE II, STAGE 2 REPORT (SAIC, 1989), ARE CONSIDERED FOR EVALUATION OF RISK. LEAD IS ALSO REPORTED AS A POTENTIAL CONTAMINANT (SAIC, 1989), AND IT IS ALSO

DISCUSSED AS TO ITS POTENTIAL RISK LEVEL.

UNDERGROUND STRUCTURES--SUCH AS PIPING--ARE ALSO CONTAMINATED AT SITE FT-3. RESIDUAL WASTE FUEL AND WASTE OIL ARE PRESENT IN THESE STRUCTURES. BECAUSE OF THE PHYSICAL LIMITATIONS IMPOSED BY THE SITE, TESTING BENEATH THE SITE FT-3 UNDERGROUND STORAGE TANK WAS NOT DONE.

SITE FT-3 GROUNDWATER

MONITORING WELLS SAMPLED DURING THE IRP PHASE II, STAGE 1 AND STAGE 2 INVESTIGATIONS ARE SHOWN IN FIGURE 15. THE DIRECTION OF GROUNDWATER FLOW AT SITE FT-3 IS NORTHEAST TOWARD THE NEARBY INTERMITTENT STREAM. TRAVEL TIME TO THE BASE BOUNDARY HAS BEEN ESTIMATED AT 6.1 YEARS, CORRESPONDING TO A CALCULATED FLOW VELOCITY OF 0.63 FT/DAY (SAIC, 1986).

DURING STAGE 1 (SAIC, 1986), GROUNDWATER SAMPLES WERE COLLECTED FROM THREE WELLS (MW-18, MW-19, AND MW-20) IN AND AROUND SITE FT-3 (SEE FIGURE 15). MONITORING WELL MW-18 IS LOCATED UPGRADIENT OF THE SITE; MW-19 IS LOCATED BETWEEN THE CURRENT FIRE TRAINING PIT AND PIPE ELM BRANCH NORTH OF THE SITE; AND MW-20 IS LOCATED BETWEEN THE SITE AND THE UNNAMED INTERMITTENT STREAM NORTHEAST OF THE SITE. GROUNDWATER SAMPLES WERE ANALYZED FOR OIL AND GREASE, METALS, TOTAL ORGANIC HALOGENS, AND TOTAL ORGANIC CARBON. OF THE METALS, NICKEL WAS DETECTED IN MW-18 (55 PPB) AND MW-20 (14 PPB) AT CONCENTRATIONS ABOVE THE EPA AMBIENT WATER QUALITY CRITERION (13.4 PPB). HOWEVER, THE HIGHER CONCENTRATION WAS DETECTED IN THE UPGRADIENT WELL (MW-18), WHILE THE CONCENTRATION IN THE DOWN GRADIENT WELL (MW-20) WAS ONLY SLIGHTLY ABOVE THE CRITERION. THEREFORE, THE HIGHER CONCENTRATION IS NOT REPRESENTATIVE OF SITE FT-3 (SAIC, 1986). THE DETECTED CONCENTRATIONS OF OTHER MEASURED ANALYTES APPEARED TO BE NONPROBLEMATIC, THOUGH TOTAL ORGANIC CARBON IN MW-20 (8.9 PPB) WAS HIGHER THAN LOCAL BACKGROUND LEVELS (SAIC, 1986).

DURING STAGE 2 (SAIC, 1989), A TOTAL OF SEVEN GROUNDWATER SAMPLES WERE COLLECTED AT SITE FT-3, ONE EACH FROM WELLS MW-18, MW-19, MW-20, MW-43S, MW-43D, MW-44S, AND MW-44D (FIGURE 15). (THE LETTERS "S" AND "D" REFER TO "SHALLOW" AND "DEEP" WITH RESPECT TO THE COLUMBIA AQUIFER.) THREE VOCS--VINYL CHLORIDE, PCE, AND TOLUENE-- WERE DETECTED INDIVIDUALLY IN THREE SEPARATE WELLS--MW-19, MW-44S, AND MW-44D, RESPECTIVELY. VINYL CHLORIDE, WHICH HAS A FEDERAL MAXIMUM CONTAMINANT LEVEL (MCL) OF 2 PPB, WAS DETECTED AT 6.9 PPB (USING EPA METHOD 624, GC/MS) AND 3.4 PPB (USING EPA METHOD 601, GC). PCE, WITH A PROPOSED MCL OF 5 PPB, WAS DETECTED AT 0.3 PPB. TOLUENE, WHICH HAS AN MCL OF 2,000 PPB, WAS FOUND TO BE PRESENT AT 0.4 PPB. NO SIGNIFICANTLY ELEVATED LEVELS OF METALS WERE OBSERVED, INCLUDING LEAD, WHICH WAS DETECTED IN ONLY TWO WELLS AT CONCENTRATIONS OF 2 AND 8 PPB, BELOW EPA'S RECOMMENDED LEVEL FOR LEAD IN GROUNDWATER OF 15 PPB.

THE PCE OBSERVED IN WELL MW-44S AND THE TOLUENE IN MW-44D APPEAR TO BE ATTRIBUTABLE TO THE MOST RECENTLY USED FIRE TRAINING PIT AND FIRE TRAINING ACTIVITIES CONDUCTED PRIOR TO MAY 1989. IT IS NOT POSSIBLE TO SPECIFY WHETHER THE ACTIVE FIRE TRAINING PIT OR THE FORMER, BURIED PIT IS THE SOURCE OF THE VINYL CHLORIDE OBSERVED IN MW-19, BECAUSE THIS WELL IS DOWN GRADIENT FROM BOTH POTENTIAL SOURCES. NOTE THAT WELL MW-19 WAS SAMPLED NEAR THE BASE OF THE GROUNDWATER COLUMN; THEREFORE VINYL CHLORIDE IS PRESENT IN THE LOWER ZONE OF THE AQUIFER. BECAUSE OF THIS THE VINYL CHLORIDE FOUND IN MW-19 IS SUSPECTED TO BE EMANATING FROM ANOTHER SOURCE. GIVEN THE ABSENCE OF VOLATILES IN WELLS MW-43S, MW-43D, AND MW-20, THE GEOLOGY OF THE SITE PROBABLY INHIBITS LATERAL MIGRATION OF CONTAMINANTS IN THE GROUNDWATER. THE RESULTS OF THE GROUNDWATER ANALYSES INDICATE THAT ACTIVITIES AT THE FIRE TRAINING AREA HAVE HAD MINIMAL OR NO EFFECT ON WATER QUALITY IN THE GROUNDWATER.

SITE FT-3 SURFACE WATER

DURING THE SITE VISIT FOR THE IRP PHASE I INVESTIGATION (ES, 1983), THERE WAS EVIDENCE OF OIL CONTAMINATION NORTH OF THE FIRE TRAINING AREA ALONG THE BANK ADJACENT TO THE DRAINAGE DITCH THAT LEADS TO THE PIPE ELM BRANCH OF LITTLE RIVER. THE RESIDUAL OIL APPEARED TO BE A RESULT OF OVERFLOW OF THE UNDERGROUND OIL/WATER SEPARATOR.

SURFACE WATER AND SEDIMENT SAMPLES WERE COLLECTED FROM THE TWO STREAMS NORTH AND NORTHEAST OF THE SITE DURING THE IRP PHASE II, STAGE 1 INVESTIGATION (SAIC, 1986). THE POSITIONS OF THE FOUR SAMPLING POINTS (FIGURE 16) WERE SELECTED AS FOLLOWS: SW-11 AND SED-D9 WERE LOCATED AT THE POINT WHERE THE NORTH STREAM DISCHARGES FROM BENEATH THE RUNWAY; SW-12 AND SED-D10 WERE LOCATED IN THE NORTH STREAM DOWNGRADIENT FROM THE SITE; SW-13 AND SED-D11 WERE LOCATED IN THE NORTHEAST STREAM AT A LOCATION WHERE GROUNDWATER FLOWING UNDER THE SITE WAS ESTIMATED TO DISCHARGE INTO THE STREAM; AND SW-14 AND SED-D12 WERE LOCATED AT THE CONFLUENCE OF THE NORTH AND NORTHEAST STREAMS. ALL SAMPLES WERE ANALYZED TO DETERMINE THE CONCENTRATIONS OF METALS, OIL AND GREASE, TOTAL ORGANIC HALOGENS, AND TOTAL ORGANIC CARBON.

THE RESULTS OF THE SURFACE WATER ANALYSES INDICATE THAT ACTIVITIES AT THE FIRE TRAINING AREA HAVE HAD MINIMAL OR NO EFFECT ON WATER QUALITY IN THE TWO STREAMS. HOWEVER, THE SEDIMENT ANALYSES INDICATED AN INCREASE IN CONTAMINANT CONCENTRATIONS FROM THE UPSTREAM SAMPLE (SED-D9) TO THE DOWNSTREAM SAMPLES (SED-D10 AND SED-D11) CLOSEST TO THE SITE. ARSENIC INCREASED FROM 11 TO 78 PARTS PER MILLION (PPM); CADMIUM, 0.67 TO 9.0; CHROMIUM, 10 TO 27; COPPER, 6.7 TO 20; NICKEL, 5.4 TO 26; LEAD, 47 TO 170; ZINC, 18 TO 76. IRON INCREASED FROM 0.52 PERCENT TO 1.8 PERCENT. ALL METAL CONCENTRATION LEVELS, EXCEPT THOSE FOR CHROMIUM, EXCEEDED THE BACKGROUND LEVELS OF THESE METALS FOR DELAWARE AND MARYLAND (SAIC, 1986). OIL AND GREASE, AS WELL AS TOTAL ORGANIC CARBON, ALSO APPEARED TO BE PRESENT AT LEVELS HIGHER THAN AN EXPECTED BACKGROUND. ALTHOUGH THE FIRE TRAINING AREA MAY HAVE CONTRIBUTED IN THE PAST (VIA RUNOFF) TO THESE CONTAMINANTS IN THE SEDIMENT, IT IS EVIDENT THAT UPGRADIENT SOURCES ARE CONTRIBUTING SIGNIFICANTLY BASED ON CONTAMINATION DETECTED UPGRADIENT OF THE SITE (SED-D9).

#SSR
VI. SUMMARY OF SITE RISKS

CONTAMINANTS OF CONCERN

TABLE 2 PRESENTS THE CONTAMINANTS DETECTED IN SOIL AND GROUNDWATER (SAIC, 1989). THESE CONTAMINANTS WERE EXAMINED USING SEVERAL CRITERIA (TOXICITY, MEASURED CONCENTRATIONS, FREQUENCY OF DETECTION, AND POTENTIAL HUMAN EXPOSURE) FOR IDENTIFICATION OF CONTAMINANTS OF CONCERN. BECAUSE FIRE TRAINING ACTIVITIES HAVE HAD A MINIMAL EFFECT ON GROUNDWATER QUALITY AND GROUNDWATER WILL BE FURTHER STUDIED AS PART OF THE BASE-WIDE INVESTIGATION, GROUNDWATER WAS NOT INCLUDED IN THE SUMMARY OF SITE RISKS. ALTHOUGH FIRE TRAINING ACTIVITIES MAY HAVE CONTRIBUTED TO CONTAMINANTS IN THE DOWNGRADIENT STREAMS, SURFACE WATER AND SEDIMENT ARE NOT BEING CONSIDERED IN THIS SUMMARY OF SITE RISKS, BECAUSE IT WAS EVIDENT FROM DATA COLLECTED DURING IRP PHASE II, STAGE 1 (SAIC, 1986) THAT UPGRADIENT SOURCES APPEAR TO HAVE CONTRIBUTED SIGNIFICANTLY MORE CONTAMINATION, AND STREAMS WILL BE STUDIED AS PART OF THE BASE-WIDE STUDY.

BASED ON EPA'S RISK ASSESSMENT GUIDANCE SEVERAL CONTAMINANTS DETECTED IN SOIL CAN BE ELIMINATED FROM FURTHER CONSIDERATION BECAUSE THEIR FREQUENCY OF OCCURRENCE IS LESS THAN 5 PERCENT (USEPA, 1989). THESE CONTAMINANTS INCLUDE TRICHLORETHANE, TETRACHLOROETHANE (PCE), 2-BUTANONE, BENZENE, 1,1-DICHLOROETHANE, AND 1,2-DICHLOROETHANE (TABLE 2). HOWEVER, BENZENE IS A GROUP A, HUMAN CARCINOGEN, AND, THEREFORE, MUST BE RETAINED. SEVERAL DETECTIONS OF ACETONE AND ONE OF 2-BUTANONE

WERE ELIMINATED FROM CONSIDERATION BASED ON QUALITY CONTROL CRITERIA, BECAUSE THE TRIP AND METHOD BLANKS WERE ALSO CONTAMINATED WITH THESE COMPOUNDS (SAIC, 1989).

BASED ON THE AFOREMENTIONED CRITERIA, THE CONTAMINANTS OF CONCERN IDENTIFIED IN SOIL AT SITE FT-3 ARE:

- BENZENE
- TOLUENE
- XYLENES (TOTAL)
- ETHYLBENZENE
- LEAD
- TOTAL PETROLEUM HYDROCARBONS (TPH)

EXPOSURE ASSESSMENT

AVAILABLE INFORMATION ON THE ENVIRONMENTAL FATE AND TRANSPORT OF CONTAMINANTS OF CONCERN IN SOIL AT SITE FT-3 IS PRESENTED IN TABLE 3. THE PRINCIPAL FATE OF ALL CONTAMINANTS OF CONCERN, EXCEPT LEAD, IN SURFICIAL SOIL AT SITE FT-3 IS VOLATILIZATION TO THE ATMOSPHERE WHERE DESTRUCTION OCCURS VIA INDIRECT PHOTOLYSIS (USEPA, 1979). IN AERATED SOILS AT GREATER DEPTH, BIODEGRADATION IS IMPORTANT AS A MECHANISM FOR ENVIRONMENTAL DESTRUCTION. THE PRINCIPAL FATE OF LEAD IS ADSORPTION TO THE SOIL. SOME LEACHING INTO THE GROUNDWATER CAN ALSO BE EXPECTED FOR ALL CONTAMINANTS OF CONCERN.

MILITARY PERSONNEL AND MAINTENANCE STAFF AT SITE FT-3 HAVE BEEN SELECTED AS THE RECEPTOR GROUP AT GREATEST RISK OF EXPOSURE TO CONTAMINANTS IN SURFACE SOIL. THIS IS THE ONLY RECEPTOR GROUP HAVING SIGNIFICANT CONTACT WITH THE SITE. THE PATHWAYS FOR POTENTIAL EXPOSURE ARE INCIDENTAL SOIL INGESTION, INHALATION OF SOIL-GENERATED DUST, AND DERMAL ABSORPTION OF SOIL CONSTITUENTS. BECAUSE ESTIMATES OF EXPOSURE VIA DERMAL ABSORPTION INCLUDE MANY UNCERTAINTIES ASSOCIATED WITH DIFFUSION OF CONTAMINANTS THROUGH BOTH SOIL AND SKIN, EXPOSURE VIA THIS PATHWAY IS CONSIDERED ONLY QUALITATIVELY (USEPA, 1989). THESE THREE PATHWAYS ARE RELEVANT TO FUTURE USE, AS WELL AS CURRENT USE, OF THE SITE FT-3 AREA. EXPOSURE TO CONTAMINANTS WAS ADJUSTED TO A LIFETIME EXPOSURE BY ASSUMING A 20-YEAR CAREER IN A 70-YEAR LIFETIME.

TOXICITY ASSESSMENT

THE RELATIONSHIP BETWEEN THE EXTENT OF EXPOSURE TO A CONTAMINANT AND THE POTENTIAL FOR ADVERSE EFFECTS WAS EVALUATED DURING THE TOXICITY ASSESSMENT PROCESS. CANCER POTENCY FACTORS (CPFS) WERE IDENTIFIED FOR POTENTIAL CARCINOGENIC CONTAMINANTS, AND REFERENCE DOSES (RFDS) WERE IDENTIFIED FOR CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS. CPFS AND RFDS FOR THE CONTAMINANTS OF CONCERN USED FOR THE TOXICITY ASSESSMENT ARE PRESENTED IN TABLE 4.

CANCER POTENCY FACTORS (CPFS) HAVE BEEN DEVELOPED BY EPA'S CARCINOGENIC ASSESSMENT GROUP FOR ESTIMATING EXCESS LIFETIME CANCER RISKS ASSOCIATED WITH EXPOSURE TO POTENTIALLY CARCINOGENIC CHEMICALS. CPFS, WHICH ARE EXPRESSED IN UNITS OF (MG/KG-DAY)-1, ARE MULTIPLIED BY THE ESTIMATED INTAKE OF A POTENTIAL CARCINOGEN, IN MG/KG-DAY, TO PROVIDE AN UPPER-BOUND ESTIMATE OF THE EXCESS LIFETIME CANCER RISK ASSOCIATED WITH EXPOSURE AT THAT INTAKE LEVEL. THE TERM "UPPER BOUND" REFLECTS THE CONSERVATIVE ESTIMATE OF THE RISKS CALCULATED FROM THE CPFS. USE OF THIS APPROACH MAKES UNDERESTIMATION OF THE ACTUAL CANCER RISK HIGHLY UNLIKELY. CANCER POTENCY FACTORS ARE DERIVED FROM THE RESULTS OF HUMAN EPIDEMIOLOGICAL STUDIES OR CHRONIC ANIMAL BIOASSAYS TO WHICH ANIMAL-TO-HUMAN EXTRAPOLATION AND UNCERTAINTY FACTORS HAVE BEEN APPLIED.

REFERENCE DOSES (RFDS) HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE

POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS. RFDS, WHICH ARE EXPRESSED IN UNITS OF MG/KG-DAY, ARE ESTIMATES OF LIFETIME DAILY EXPOSURE LEVELS FOR HUMANS, INCLUDING SENSITIVE INDIVIDUALS. ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G., THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) CAN BE COMPARED TO THE RFD. RFDS ARE DERIVED FROM HUMAN EPIDEMIOLOGICAL STUDIES OR ANIMAL STUDIES TO WHICH UNCERTAINTY FACTORS HAVE BEEN APPLIED (E.G., TO ACCOUNT FOR THE USE OF ANIMAL DATA TO PREDICT EFFECTS ON HUMANS). THESE UNCERTAINTY FACTORS HELP ENSURE THAT THE RFDS WILL NOT UNDERESTIMATE THE POTENTIAL FOR ADVERSE NONCARCINOGENIC EFFECTS TO OCCUR.

RISK CHARACTERIZATION

EXCESS LIFETIME CANCER RISKS FOR SITE FT-3 WERE DETERMINED BY MULTIPLYING THE DAILY INTAKE OF CHEMICALS FROM ENVIRONMENTAL MEDIA BY THE CANCER POTENCY FACTOR. THESE RISKS ARE PROBABILITIES EXPRESSED IN SCIENTIFIC NOTATION (I.E. 1E-6). AN EXCESS LIFETIME CANCER RISK OF 1E-6 INDICATES THAT AN INDIVIDUAL HAS A ONE IN A MILLION ADDITIONAL CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR LIFETIME. FOR KNOWN OR SUSPECTED CARCINOGENS, ACCEPTABLE EXPOSURE LEVELS ARE GENERALLY CONCENTRATION LEVELS THAT REPRESENT AN EXCESS UPPER BOUND FOR LIFETIME CANCER RISK TO AN INDIVIDUAL OF BETWEEN 1E-4 AND 1E-6, HOWEVER, THE POINT OF DEPARTURE, AS DESCRIBED IN THE NCP, IS CONSIDERED TO BE 1E-6. SEE 40 CFR 300.430(2)(I)(A)(2).

THE ESTIMATED EXCESS LIFETIME CANCER RISK FOR EACH OF THE EXPOSURE PATHWAYS IS PRESENTED BELOW:

EXPOSURE TO SITE FT-3 SOILS

	ROUTE OF EXPOSURE	
POPULATION	INGESTION	INHALATION
MILITARY PERSONNEL/ MAINTENANCE STAFF	1.1E-10	4.9E-14

POTENTIAL CONCERN FOR NONCARCINOGENIC EFFECTS OF A SINGLE CONTAMINANT IN A SINGLE MEDIUM IS EXPRESSED AS THE HAZARD QUOTIENT (HQ) (I.E., THE RATIO OF THE ESTIMATED INTAKE DERIVED FROM THE CONTAMINANT CONCENTRATION IN A GIVEN MEDIUM TO THE CONTAMINANTS REFERENCE DOSE). THE HQS FOR ALL CONTAMINANTS IN A MEDIUM ARE ADDED TO OBTAIN THE HAZARD INDEX (HI). THE HI PROVIDES A REFERENCE POINT FOR GAUGING THE SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA. AN HI LESS THAN OR EQUAL TO 1 INDICATES THAT THERE IS NO SIGNIFICANT RISK OF ADVERSE HEALTH EFFECTS.

THE HIS DERIVED FOR THE SOIL MEDIUM ARE SUMMARIZED BELOW:

EXPOSURE TO SITE FT-3 SOILS

	ROUTE OF EXPOSURE		
POPULATION	INGESTION	INHALATION	TOTAL
MILITARY PERSONNEL/	7.1E-05	1.2E-08	7.0E-05

ALTHOUGH POSSIBLE GROUNDWATER REMEDIATION IS NOT PART OF THIS ROD, AN EXPOSURE PATHWAY WAS CONSIDERED FOR POSSIBLE CONTAMINANT MIGRATION FROM SITE FT-3 SOIL TO GROUNDWATER.

A MATHEMATICAL MODEL WHICH CALCULATES THE LEVEL IN SOIL THAT WOULD BE PROTECTIVE OF GROUNDWATER WAS USED FOR SITE FT-3 CONTAMINANTS OF CONCERN. THIS MODEL WAS DEVELOPED TO ESTIMATE THE POINT AT WHICH CONTAMINANT CONCENTRATIONS IN THE SOIL WILL PRODUCE GROUNDWATER CONTAMINANT CONCENTRATIONS ABOVE ACCEPTABLE LEVELS. THE RESULTANT CONCENTRATIONS IN SOIL CAN BE USED AS SOIL CLEANUP LEVELS.

BENZENE WAS SELECTED AS THE CONTAMINANT OF CONCERN TO CALCULATE AN ACCEPTABLE SOIL LEVEL. BENZENE IS A KNOWN HUMAN CARCINOGEN, HAS A FAIRLY HIGH WATER SOLUBILITY, AND IS A COMMON CONSTITUENT IN WASTE FUELS AND OILS. THE MATHEMATICAL COMPUTATION PRODUCED A VALUE FOR BENZENE IN SOIL OF APPROXIMATELY 5 PPM, SIGNIFICANTLY ABOVE THE HIGHEST CONCENTRATION AT THE SITE, 31 PPB.

IT IS EVIDENT FROM TABLE 4 AND THE GROUNDWATER PROTECTION MODEL THAT THE RISKS POSED BY SITE FT-3 SOIL TO DERMAL CONTACT, ACCIDENTAL INGESTION, AND CONTAMINANT TRANSPORT TO GROUNDWATER ARE WELL BELOW EPA GUIDANCE LEVELS.

FIRE AND EXPLOSION THREAT

SITE FT-3 STRUCTURES CONTAIN RESIDUAL WASTE OIL AND WASTE FUEL. THE RESIDUAL WASTE OIL AND WASTE FUEL IS FLAMMABLE. WHILE THE WASTE OIL/FUEL DOES NOT POSE AN UNACCEPTABLE CARCINOGENIC RISK AND/OR NONCARCINOGENIC EXPOSURE RISK, THE EXISTENCE OF THIS RESIDUAL WASTE OIL AND WASTE FUEL POSES A THREAT OF FIRE AND EXPLOSION.

#DA
VII. DESCRIPTION OF ALTERNATIVES

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THE SITE, IF NOT ADDRESSED BY IMPLEMENTATION OF THE RESPONSE ACTION SELECTED IN THIS ROD, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH AND THE ENVIRONMENT.

A NUMBER OF REMEDIAL ALTERNATIVES WERE DEVELOPED TO SIGNIFICANTLY REDUCE THE RISK TO PUBLIC HEALTH AND THE ENVIRONMENT FROM THE SITE FT-3 SOIL AND STRUCTURES. THE FOLLOWING SECTIONS BRIEFLY SUMMARIZE EACH OF THESE ALTERNATIVES. THE PRESENT WORTH COST WAS CALCULATED USING THE CAPITAL COST OF THE REMEDY PLUS, THE COST OF 20 YEARS OPERATION AND MAINTENANCE (O&M).

ALTERNATIVE 1: NO ACTION

EVALUATION OF THE NO ACTION ALTERNATIVE IS REQUIRED BY THE NATIONAL OIL AND HAZARDOUS SUBSTANCES CONTINGENCY PLAN (NCP). THIS ALTERNATIVE SERVES AS A POINT OF REFERENCE FOR COMPARING ALL OTHER ALTERNATIVES. IF OTHER ALTERNATIVES OFFER NO SUBSTANTIAL ADVANTAGES OVER THE NO ACTION ALTERNATIVE, NO ACTION MAY BE CONSIDERED APPROPRIATE. TOTAL COST FOR THIS ALTERNATIVE IS $0.

ALTERNATIVE 2: CAPPING AND A PERIMETER SLURRY WALL, AND DECONTAMINATION, REMOVAL, AND OFFBASE DISPOSAL OF PIPING/STRUCTURES

THIS ALTERNATIVE INVOLVES THE CONSTRUCTION OF A COMPOSITE CAP OVER THE CONTAMINATED SOILS AND A SLURRY CUTOFF WALL AROUND THE ENTIRE PERIMETER OF THE CAP, TO BE IMPLEMENTED AFTER THE DECONTAMINATION, REMOVAL, AND OFFBASE DISPOSAL OF PIPING/STRUCTURES.

DECONTAMINATION OF THE PIPING/STRUCTURES WILL REQUIRE REMOVAL OF ANY RESIDUAL LIQUID, SLUDGE, AND/OR SOLID MATERIAL FROM WITHIN THESE UNITS. REMOVAL OF THE UNDERGROUND PIPING WITH THE APPROPRIATE EXCAVATION EQUIPMENT PRIOR TO CLEANUP WILL FACILITATE DECONTAMINATION ACTIVITIES. PUMPS, MANUAL LABOR, AND OTHER APPROPRIATE MECHANICAL EQUIPMENT WILL BE USED TO CLEAN THE PIPING/STRUCTURES. STEAM-CLEANING WILL THEN BE USED TO DECONTAMINATE THE PIPING/STRUCTURES. THE MATERIAL REMOVED FROM THESE UNITS AND THE SOLUTIONS RESULTING FROM DECONTAMINATION PROCEDURES WILL BE COLLECTED IN TANKER TRUCKS, VACUUM TRUCKS, 55-GALLON DRUMS, OR OTHER SUITABLE CONTAINERS PRIOR TO SHIPMENT AND OFFBASE DISPOSAL. ANALYSIS OF THE WASTE MATERIALS WILL BE PERFORMED TO DETERMINE THE APPROPRIATE DISPOSAL AND/OR TREATMENT REQUIREMENTS FOR THE COLLECTED MATERIAL. THE

UST AND THE OIL/WATER SEPARATOR WILL THEN BE REMOVED WITH THE APPROPRIATE EXCAVATION EQUIPMENT. ALL OF THE DECONTAMINATED PIPING AND STRUCTURES WILL THEN BE TRANSPORTED AND DISPOSED OF OFFBASE AT A SANITARY LANDFILL OR SALVAGE YARD.

A 2-FOOT-WIDE, 50-FOOT-DEEP, AND 1,600-FOOT-LONG SOIL-BENTONITE SLURRY CUT-OFF WOULD THEN BE INSTALLED TO ISOLATE THE CONTAMINATED SOILS FROM THE SURROUNDING SHALLOW GROUNDWATER. THIS TECHNIQUE INVOLVES EXCAVATING A TRENCH AND FILLING IT WITH SLURRY THAT WOULD KEEP THE TRENCH OPEN WITH VERTICAL SIDES, EVEN BELOW THE WATER TABLE. THE SLURRY WOULD BE COMPOSED OF BENTONITE-CLAY AND WATER. THE EXCAVATION OF THE TRENCH WOULD BE PERFORMED FROM THE GROUND SURFACE USING CONVENTIONAL EQUIPMENT CAPABLE OF ACHIEVING THE REQUIRED TRENCH WIDTHS AND DEPTHS. AFTER THE TRENCH HAS BEEN EXCAVATED TO ITS FINAL DEPTH, A MIXTURE OF SOIL AND BENTONITE WOULD BE PLACED IN THE TRENCH, RESULTING IN THE DISPLACEMENT OF THE BENTONITE SLURRY AND THE FORMATION OF THE CUTOFF WALL. THE 50-FOOT DEPTH OF THE SLURRY WALL WILL BE SUFFICIENT TO ANCHOR THE WALL IN THE STIFF, LOW-PERMEABILITY CLAY LAYER OF THE KIRKWOOD FORMATION THAT WAS ENCOUNTERED AT THE BOTTOM OF THE BORINGS DRILLED FOR THE DEEP WELLS AT THE SITE (SAIC, 1989). THIS ANCHORING WOULD BE NECESSARY TO PREVENT ANY GROUNDWATER FROM FLOWING INTO OR OUT OF THE WATER TABLE AQUIFER UNDER SITE FT-3.

A COMPOSITE CAP CONSISTING OF A GEOMEMBRANE, A DRAINAGE LAYER, AND A SOIL COVER WOULD THEN BE PLACED OVER THE EXISTING CONTAMINATED SOILS INSIDE THE SLURRY CUTOFF WALL. ANY EXCESS SOIL EXCAVATED FROM THE SLURRY TRENCHES THAT CANNOT BE REUSED DURING THE CONSTRUCTION OF THE SLURRY WALL WOULD BE SPREAD OVER THE AREA TO BE COVERED BY THE CAP, THUS ENSURING THAT ANY CONTAMINANTS IN THE SOIL ARE CONTAINED BY THE CAP. THE SURFACE OF THE CAP SHOULD SLOPE (1 TO 3 PERCENT) TO PREVENT PONDING OF WATER, AND THE CAP SHOULD EXTEND OVER THE SLURRY WALL AND, IF POSSIBLE, BE ANCHORED INTO THE WALL.

BEFORE INSTALLING THE CAP SYSTEM, THE SITE WOULD BE GRADED AND LARGE OBJECTS (E.G., BOULDERS, CONCRETE SLAB FRAGMENTS), IF PRESENT, WOULD BE REMOVED; THEN A LAYER OF NONWOVEN GEOTEXTILE FABRIC WOULD BE PLACED OVER THE SITE. THIS FABRIC LAYER WOULD PROTECT THE OVERLYING 60-MIL HDPE GEOMEMBRANE, WHICH WOULD SERVE AS AN IMPERMEABLE BARRIER OVER THE CONTAMINATED SOILS, FROM PUNCTURING.

A DRAINAGE LAYER WOULD BE PLACED ON TOP OF THE GEOMEMBRANE. THIS LAYER WOULD BE INSTALLED OVER THE ENTIRE EXPOSED CAP AND WOULD DRAIN ANY WATER THAT INFILTRATES THROUGH THE SOIL COVER.

A 2-FOOT-THICK LAYER OF CLEAN SOIL WOULD BE PLACED ON TOP OF THE DRAINAGE LAYER AND SEEDED. VEGETATION WOULD PREVENT EROSION OF THE SOIL LAYER, WHICH WOULD BE GRADED TO PREVENT RUN-ON AND PROMOTE RUNOFF.

THIS ALTERNATIVE WOULD HAVE TO COMPLY WITH RCRA SUBTITLE C REQUIREMENTS FOR CLOSURE OF LAND DISPOSAL UNITS.

THIS ALTERNATIVE WOULD TAKE APPROXIMATELY 4 MONTHS TO IMPLEMENT AND THE PRESENT WORTH COST IS $1,668,500.

ALTERNATIVE 3: EXCAVATION, ONBASE LANDFARMING, AND ONSITE TREATED SOIL DISPOSAL, AND DECONTAMINATION, REMOVAL, AND OFFBASE DISPOSAL OF PIPING/STRUCTURES

THIS ALTERNATIVE INCLUDES DECONTAMINATION, REMOVAL, AND DISPOSAL OF EXISTING PIPING/STRUCTURES FOLLOWED BY EXCAVATION AND ABOVEGROUND BIOREMEDIATION (LANDFARMING) OF THE CONTAMINATED SOILS AT SITE FT-3. FOLLOWING TREATMENT, THE SOILS WOULD BE USED AS BACKFILL MATERIAL AT THE EXCAVATED SITE.

DECONTAMINATION OF THE PIPING/STRUCTURES WILL REQUIRE REMOVAL OF ANY RESIDUAL LIQUID, SLUDGE, AND /OR SOLID MATERIAL WITHIN THESE UNITS. REMOVAL OF THE UNDERGROUND PIPING WITH THE APPROPRIATE EXCAVATION EQUIPMENT PRIOR TO CLEANUP WILL FACILITATE DECONTAMINATION ACTIVITIES. PUMPS, MANUAL LABOR, AND OTHER APPROPRIATE MECHANICAL EQUIPMENT WILL BE USED TO CLEAN THE PIPING/STRUCTURES. STEAM-CLEANING WILL THEN BE USED TO DECONTAMINATE THE PIPING/STRUCTURES. THE MATERIAL REMOVED FROM THESE UNITS AND THE SOLUTIONS RESULTING FROM DECONTAMINATION PROCEDURES WILL BE COLLECTED IN TANKER TRUCKS, VACUUM TRUCKS, 55-GALLON DRUMS, OR OTHER SUITABLE CONTAINERS PRIOR TO SHIPMENT AND OFFBASE DISPOSAL. ANALYSIS OF THE WASTE MATERIALS WILL BE PERFORMED TO DETERMINE THE APPROPRIATE DISPOSAL AND /OR TREATMENT REQUIREMENTS FOR THE COLLECTED MATERIAL. THE UST AND THE OIL/WATER SEPARATOR WILL THEN BE REMOVED WITH THE APPROPRIATE EXCAVATION EQUIPMENT. ALL OF THE DECONTAMINATED PIPING AND STRUCTURES WILL THEN BE TRANSPORTED AND DISPOSED OF OFFBASE AT A SANITARY LANDFILL OR SALVAGE YARD.

FOLLOWING DECONTAMINATION, REMOVAL, AND DISPOSAL OF THE SITE FT-3 PIPING/STRUCTURES, EXCAVATION AND TREATMENT ACTIVITIES ASSOCIATED WITH THE SITE FT-3 CONTAMINATED SOILS WOULD BEGIN. THE AREA TO BE EXCAVATED IS APPROXIMATELY 2.6 ACRES. EXCAVATION WOULD EXTEND TO DEPTHS RANGING FROM 2 TO 8 FEET OR TO THE WATER TABLE, WHICHEVER IS SHALLOWER. THE TOTAL AMOUNT OF SOIL TO BE EXCAVATED FROM SITE FT-3 IS ESTIMATED TO BE 19,000 CUBIC YARDS IN PLACE. DUE TO THE UNCOHESIVE NATURE OF SOME OF THE SOILS AT SITE FT-3, SLOPING OF THE EXCAVATION BOUNDARIES MAY BE NECESSARY TO PREVENT SLOUGHING AROUND THE EXCAVATION PERIMETER.

CONVENTIONAL EXCAVATION EQUIPMENT WOULD BE USED TO REMOVE THE SITE FT-3 CONTAMINATED SOILS. LIGHT SPRAYING OF WATER WILL BE USED TO CONTROL DUST GENERATED DURING EXCAVATION OF DRY SOILS. CONSTRUCTION OF A TEMPORARY SILT FENCE AROUND THE EXCAVATION BOUNDARIES DURING EXCAVATION AND BACKFILLING ACTIVITIES WOULD PREVENT EROSION OF THE SITE.

THE EXCAVATED SOIL WOULD BE PLACED IN DUMP TRUCKS AND TAKEN TO THE ONBASE LOCATION THAT HAS BEEN SELECTED FOR THE ABOVEGROUND LANDFARMING PROCESS. PILOT-SCALE TESTS CONDUCTED BY A QUALIFIED CONTRACTOR PRIOR TO REMEDIATION WILL BE USED TO DETERMINE THE PREPARATION REQUIREMENTS FOR THE SELECTED TREATMENT SITE. THE TREATMENT SITE WILL BE CLEARED OF SURFACE DEBRIS, LARGE ROCKS, AND BRUSH. FURTHERMORE, THE AREA SELECTED WILL BE LARGE ENOUGH TO ACCOMMODATE THE ESTIMATED 19,000 CUBIC YARDS OF SOIL EXPECTED TO BE REMOVED FROM SITE FT-3. SIX TO SEVEN ACRES OF LAND WILL BE REQUIRED TO TREAT THE QUANTITY OF CONTAMINATED SOIL ANTICIPATED FROM SITE FT-3. THE TREATMENT SITE WILL BE GRADED, PROVIDED WITH A BERM FOR RUN-ON AND RUNOFF CONTROL AND/OR COLLECTION, AND, IF NECESSARY, PROVIDED WITH NUTRIENTS, FERTILIZERS, MICROBES, AND/OR OTHER AGENTS NECESSARY TO ENHANCE THE BIODEGRADATION PROCESS. THE SOILS WOULD BE SPREAD OUT AND TREATED ON A LINER THAT WILL PREVENT CONTACT WITH THE UNDERLYING SOILS. RESULTS OF PILOT-SCALE TESTS WILL BE USED DETERMINE THE PROPER RATIO OF NUTRIENTS, WATER, AIR, AND OXIDIZING OR REDUCING AGENTS TO BE ADDED TO THE SOILS THAT WILL ENSURE OPTIMAL CONDITIONS FOR DEGRADATION OF THE CONTAMINANTS. RUNOFF FROM THE TREATMENT SITE WILL BE COLLECTED AND, IF NECESSARY, REAPPLIED TO THE TREATMENT SITE UNTIL THE CONCENTRATIONS OF CONTAMINANTS IN THE LIQUID RUNOFF ARE BELOW ACCEPTABLE LEVELS. OFFBASE TREATMENT OF THIS LIQUID MAY BE NECESSARY IF REAPPLICATION PROVES INEFFECTIVE.

SAMPLING AND ANALYSIS OF THE TREATED SOILS WILL BE CONDUCTED DURING BIOREMEDIATION TO MONITOR THE PROGRESS OF THE TREATMENT PROCESS. ONCE ACCEPTABLE CONTAMINANT CONCENTRATIONS IN THE SOILS ARE ACHIEVED, THE TREATED SOILS WILL BE COLLECTED WITH THE APPROPRIATE HEAVY CONSTRUCTION EQUIPMENT, LOADED INTO DUMP TRUCKS, AND TRANSPORTED BACK TO SITE FT-3. THE TREATED SOIL WOULD THEN BE BACKFILLED AND COMPACTED IN THE EXCAVATED AREAS OF THE SITE. BOTH THE TREATMENT SITE AND SITE FT-3 WOULD THEN BE

SEEDED TO PROMOTE REVEGETATION. THE TREATMENT SITE SOILS WOULD BE SAMPLED AND ANALYZED FOR TPH PRIOR TO AND FOLLOWING THE BIOREMEDIATION PROCESS TO ENSURE THAT THE SITE IS RETURNED TO ITS ORIGINAL CONDITION. ANY ADDITIONAL TREATMENT REQUIRED TO ENSURE THE SOILS ARE RETURNED TO THEIR ORIGINAL CONDITION WILL BE PERFORMED.

GROUNDWATER MAY SEEP INTO THE SITE FT-3 EXCAVATED AREA DURING THE EXCAVATION AND LANDFARMING PROCESS. THIS WATER WOULD BE SAMPLED AND, IF CONTAMINATED, PUMPED INTO A TANK TRUCK AND SHIPPED OFFBASE FOR TREATMENT AT A RCRA PERMITTED FACILITY. THE QUANTITY OF WATER FROM GROUNDWATER SEEPING IS ESTIMATED TO BE LESS THAN 15,000 GALLONS. ANY EXCAVATED WET SOILS WOULD BE STOCKPILED, ON A LINER, IN THE VICINITY OF THE EXCAVATION TO ALLOW FOR DEWATERING PRIOR TO ON-BASE TREATMENT BY LANDFARMING. THE WATER FROM THE STOCKPILED SOILS WOULD THEN BE DIRECTED TO DRAIN BACK INTO THE EXCAVATED AREA FOR COLLECTION AND RECOVERY AS NECESSARY.

THIS ALTERNATIVE WOULD COMPLY WITH RCRA SUBTITLE C REQUIREMENTS FOR LAND TREATMENT.

THIS ALTERNATIVE WOULD TAKE APPROXIMATELY 6 TO 12 MONTHS TO IMPLEMENT AND THE PRESENT WORTH COST IS $1,597,300.

ALTERNATIVE 4: EXCAVATION AND DISPOSAL OF SOILS IN AN OFFBASE RCRA LANDFILL, AND DECONTAMINATION, REMOVAL, AND OFFBASE DISPOSAL OF PIPING/STRUCTURES

THIS ALTERNATIVE INCLUDES DECONTAMINATION, REMOVAL, AND DISPOSAL OF THE EXISTING PIPING/STRUCTURES AT SITE FT-3 FOLLOWED BY EXCAVATION, TRANSPORTATION, AND OFFBASE DISPOSAL OF THE CONTAMINATED SITE SOILS IN A RCRA-PERMITTED LANDFILL.

DECONTAMINATION OF THE PIPING/STRUCTURES WILL REQUIRE REMOVAL OF ANY RESIDUAL LIQUID, SLUDGE, AND /OR SOLID MATERIAL FROM WITHIN THESE UNITS. REMOVAL OF THE UNDERGROUND PIPING WITH THE APPROPRIATE EXCAVATION EQUIPMENT PRIOR TO CLEANUP WILL FACILITATE DECONTAMINATION ACTIVITIES. PUMPS, MANUAL LABOR, AND OTHER APPROPRIATE MECHANICAL EQUIPMENT WILL BE USED TO CLEAN THE PIPING/STRUCTURES. STEAM-CLEANING WILL THEN BE USED TO DECONTAMINATE THE PIPING/STRUCTURES. THE MATERIAL REMOVED FROM THESE UNITS AND THE SOLUTIONS RESULTING FROM DECONTAMINATION PROCEDURES WILL BE COLLECTED IN TANKER TRUCKS, VACUUM TRUCKS, 55-GALLON DRUMS, OR OTHER SUITABLE CONTAINERS PRIOR TO SHIPMENT AND OFFBASE DISPOSAL. ANALYSIS OF THE WASTE MATERIALS WILL BE PERFORMED TO DETERMINE THE APPROPRIATE DISPOSAL AND /OR TREATMENT REQUIREMENTS FOR THE COLLECTED MATERIAL. THE UST AND THE OIL/WATER SEPARATOR WILL THEN BE REMOVED WITH THE APPROPRIATE EXCAVATION EQUIPMENT. ALL OF THE DECONTAMINATED PIPING AND STRUCTURES WILL THEN BE TRANSPORTED AND DISPOSED OF OFFBASE AT A SANITARY LANDFILL OR SALVAGE YARD.

FOLLOWING DECONTAMINATION, REMOVAL, AND DISPOSAL OF THE PIPING/STRUCTURES, EXCAVATION OF THE SITE FT-3 SOILS IN PREPARATION FOR OFFBASE TRANSPORT AND DISPOSAL WOULD BEGIN. CONVENTIONAL EXCAVATION EQUIPMENT WOULD BE USED TO REMOVE THE SITE FT-3 CONTAMINATED SOILS, AND LIGHT SPRAYING OF WATER WILL BE USED TO CONTROL DUST GENERATED DURING EXCAVATION OF DRY SOILS. CONSTRUCTION OF A TEMPORARY SILT FENCE AROUND THE EXCAVATION BOUNDARIES DURING EXCAVATION AND BACK-FILLING ACTIVITIES WOULD PREVENT EROSION OF THE SITE SOILS.

THE EXCAVATED SOIL WOULD BE CONTAINERIZED IN ROLLOFF BOXES AND LOADED ONTO FLATBED TRAILER TRUCKS FOR BULK SHIPMENT. ARRANGEMENTS WITH THE RCRA LANDFILL CHOSEN TO DISPOSE OF THE SOILS WILL BE NECESSARY PRIOR TO SHIPMENT. THE RCRA LANDFILL WILL MOST LIKELY REQUIRE ADDITIONAL SAMPLING AND ANALYSIS OF THE SOILS, SUCH AS FOR IGNITABILITY, PRIOR TO ACCEPTANCE. FOLLOWING EXCAVATION, SITE FT-3 WOULD BE BACKFILLED WITH

CLEAN FILL, GRADED, AND SEEDED.

AS WITH ALTERNATIVE III, ANY GROUNDWATER SEEPING INTO THE EXCAVATED AREA WILL BE SAMPLED AND, IF CONTAMINATED, PUMPED INTO A TANK TRUCK AND SHIPPED OFFBASE FOR TREATMENT AT A RCRA PERMITTED FACILITY. THE QUANTITY OF GROUNDWATER SEEPING INTO THE EXCAVATED AREA PRIOR TO BACKFILLING IS ESTIMATED TO BE LESS THAN 15,000 GALLONS. ANY EXCAVATED WET SOILS WOULD BE STOCKPILED, ON A LINER, IN THE VICINITY OF THE EXCAVATION TO ALLOW DEWATERING PRIOR TO OFFBASE SHIPMENT AND DISPOSAL. THE WATER FROM THE STOCKPILED SOILS WOULD BE CHANNELED BACK INTO THE EXCAVATED AREA FOR COLLECTION AND RECOVERY AS NECESSARY.

THIS ALTERNATIVE WOULD COMPLY WITH TRANSPORTATION AND DISPOSAL STANDARDS (40 CFR PART 264, SUBPART B) AND LANDFILL STANDARDS (40 CFR PART 264, SUBPART N).

THIS ALTERNATIVE WOULD TAKE APPROXIMATELY 3 TO 5 MONTHS TO IMPLEMENT AND THE PRESENT WORTH COST IS $7,336,300.

ALTERNATIVE 5: DECONTAMINATION, REMOVAL, AND OFFBASE DISPOSAL OF PIPING/STRUCTURES, SAMPLING SOIL AROUND UST, SOIL COVER OVER SITE FT-3

THIS ALTERNATIVE INCLUDES DECONTAMINATION, REMOVAL AND DISPOSAL OF EXISTING PIPING/STRUCTURES, FOLLOWED BY TESTING AROUND THE UST, AND PLACEMENT OF A SOIL COVER OVER SITE FT-3.

RESIDUAL LIQUID, SLUDGE, AND SOLID MATERIALS WILL BE REMOVED FROM THE PIPING/STRUCTURES AT SITE FT-3 USING PUMPS, MANUAL LABOR, AND OTHER APPROPRIATE MECHANICAL EQUIPMENT. THE UNDERGROUND PIPING WILL MOST LIKELY REQUIRE REMOVAL WITH A BACKHOE OR OTHER SUITABLE EQUIPMENT PRIOR TO CLEANUP. THE LIQUID SLUDGE, AND SOLID MATERIALS WILL BE COLLECTED IN A TANKER TRUCK, 55 GALLON DRUMS, OR OTHER SUITABLE CONTAINERS AND SHIPPED OFF SITE TO A DISPOSAL FACILITY PERMITTED TO TREAT OR DISPOSE OF THE COLLECTED WASTE. ANALYSIS OF THE WASTE MATERIALS WILL BE PERFORMED TO DETERMINE THE APPROPRIATE DISPOSAL AND/OR TREATMENT REQUIREMENTS.

FOLLOWING REMOVAL OF RESIDUAL MATERIALS, REMAINING CONTAMINATION COULD BE REMOVED USING HIGH-PRESSURE (UP TO 3,000 PSI) AND HIGH-TEMPERATURE STEAM (OR HOT WATER) CLEANING EQUIPMENT IN COMBINATION WITH A SUITABLE CLEANING AGENT. THIS SOLUTION WILL ALSO REQUIRE COLLECTION AND OFFBASE DISPOSAL AND/OR TREATMENT.

THE UNDERGROUND STRUCTURES, WHICH INCLUDE A UST AND OIL/WATER SEPARATOR, WOULD BE REMOVED BY MEANS OF A HYDRAULIC BACKHOE OR OTHER SUITABLE EQUIPMENT. THE ASSOCIATED PIPING WILL MOST LIKELY REQUIRE REMOVAL PRIOR TO CLEANUP. THE UST AND OIL/WATER SEPARATOR, ALONG WITH THE DECONTAMINATED ABOVEGROUND DUMPSTERS AND PREVIOUSLY REMOVED AND CLEANED PIPING, WOULD THEN BE SHIPPED OFF-SITE FOR DISPOSAL AT A SANITARY LANDFILL OR SALVAGE YARD.

THE EXCAVATED AREAS AT SITE FT-3 WOULD BE BACKFILLED AND GRADED FOLLOWING REMOVAL OF THE PIPING/STRUCTURES. A SOIL COVER WOULD THEN BE PLACED ON SITE FT-3 AND THE AREA REVEGETATED.

THIS ALTERNATIVE WOULD COMPLY WITH TRANSPORTATION AND DISPOSAL STANDARDS (40 CFR PART 264, SUBPART B) AND RCRA AND DELAWARE UST REQUIREMENTS FOR DISPOSAL OF LIQUID WASTE.

THIS ALTERNATIVE WOULD TAKE APPROXIMATELY 2 MONTHS TO IMPLEMENT AND THE PRESENT WORTH COST IS $100,000.

#SCAA

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

THE AIR FORCE HAS EVALUATED EACH OF THE REMEDIAL ALTERNATIVES DEVELOPED FOR SITE FT-3 WITH RESPECT TO NINE SPECIFIC CRITERIA LISTED BELOW.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT--ADDRESSES WHETHER OR NOT A REMEDY WILL (1) CLEANUP A SITE TO WITHIN THE RISK RANGE; (2) RESULT IN ANY UNACCEPTABLE IMPACTS; (3) CONTROL THE INHERENT HAZARDS (E.G., TOXICITY AND MOBILITY) ASSOCIATED WITH A SITE; AND (4) MINIMIZE THE SHORT-TERM IMPACTS ASSOCIATED WITH CLEANING UP THE SITE.

COMPLIANCE WITH ARARS--ADDRESSES WHETHER OR NOT A REMEDY WILL MEET ALL OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF OTHER ENVIRONMENTAL STATUTES AND/OR PROVIDE GROUNDS FOR INVOKING A WAIVER.

LONG-TERM EFFECTIVENESS AND PERMANENCE--REFERS TO THE ABILITY OF A REMEDY TO MAINTAIN RELIABLE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER TIME, ONCE CLEANUP GOALS HAVE BEEN MET.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT--REFERS TO THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES THAT MAY BE EMPLOYED IN A REMEDY.

SHORT-TERM EFFECTIVENESS--REFERS TO THE PERIOD OF TIME NEEDED TO ACHIEVE PROTECTION, AND ANY ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY BE POSED DURING THE CONSTRUCTION AND IMPLEMENTATION PERIOD UNTIL CLEANUP GOALS ARE ACHIEVED.

IMPLEMENTABILITY--DESCRIBES THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF A REMEDY, INCLUDING THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT THE CHOSEN SOLUTION.

COST--INCLUDES THE CAPITAL FOR MATERIALS, EQUIPMENT, ETC., AND THE OPERATION AND MAINTENANCE COSTS.

SUPPORT AGENCY ACCEPTANCE--INDICATES WHETHER, BASED ON THEIR REVIEW OF THE RI, FFS, AND THE PROPOSED PLAN, EPA AND DNREC CONCUR WITH, OPPOSE, OR HAVE NO COMMENT ON THE PREFERRED ALTERNATIVE.

COMMUNITY ACCEPTANCE--WILL BE ASSESSED IN THE RECORD OF DECISION FOLLOWING A REVIEW OF THE PUBLIC COMMENTS RECEIVED ON THE RI, FFS, AND THE PROPOSED PLAN.

THE FOLLOWING SECTIONS PRESENT A BRIEF DISCUSSION OF EACH OF THE EVALUATION CRITERIA AND A COMPARATIVE ANALYSIS OF EACH OF THE REMEDIAL ALTERNATIVES BASED ON THE NINE CRITERIA. EACH OF THE ACTION ALTERNATIVES WILL ADDRESS THE PRINCIPLE THREAT, FIRE AND EXPLOSION, POSED BY SITE FT-3, HOWEVER, BECAUSE THE RISK TO HUMAN HEALTH AND THE ENVIRONMENT FROM SITE FT-3 SOILS IS BELOW RISK BASED LEVELS, (SEE SECTION VI SUMMARY OF SITE RISKS), THERE IS NO NEED TO REMEDIATE SITE FT-3 SOILS.

1) OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THIS CRITERION ADDRESSES WHETHER OR NOT A REMEDY WILL (1) CLEANUP A SITE TO WITHIN THE RISK RANGE; (2) RESULT IN ANY UNACCEPTABLE IMPACTS; (3) CONTROL THE INHERENT HAZARDS (E.G., TOXICITY AND MOBILITY) ASSOCIATED WITH A SITE; AND (4) MINIMIZE THE SHORT-TERM IMPACTS ASSOCIATED WITH CLEANING UP THE SITE.

THE PRIMARY HUMAN HEALTH RISK ASSOCIATED WITH THE SITE IS FROM ONSITE PIPING AND STRUCTURES. THIS RISK IS THE RISK OF FIRE AND EXPLOSION POSED BY RESIDUAL WASTE OIL AND WASTE FUEL.

THE NO ACTION ALTERNATIVE (ALTERNATIVE 1) DOES NOT ABATE THE RISK OF FIRE AND EXPLOSION. THEREFORE, ALTERNATIVE 1 IS JUDGED TO BE UNPROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND WILL NOT BE DISCUSSED FURTHER.

HE FOUR ACTION ALTERNATIVES UNDER CONSIDERATION WERE FOUND TO PROVIDE HIGH LEVELS OF PROTECTIVENESS. ALTERNATIVES 2, 3, 4, AND 5 WOULD ELIMINATE THE THREAT OF FIRE AND EXPLOSION POSED BY THE PIPING/STRUCTURES THROUGH REMOVAL AND DECONTAMINATION OF THE PIPING STRUCTURES.

2) COMPLIANCE WITH ARARS

THIS CRITERION ADDRESSES WHETHER OR NOT A REMEDY WILL MEET ALL OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF OTHER ENVIRONMENTAL STATUTES AND/OR PROVIDE GROUNDS FOR INVOKING A WAIVER.

A COMPLETE LISTING OF ALL SITE-RELATED ACTION AND LOCATION SPECIFIC ARARS IS PRESENTED IN TABLE 5. ALL OF THE ACTION ALTERNATIVES WILL MEET ARARS, AND NO WAIVERS WILL BE REQUIRED. THE CREATION OF AN ON-SITE LANDFILL IN ALTERNATIVE 2 WOULD HAVE TO MEET ALL APPLICABLE STATE AND FEDERAL REGULATIONS REGARDING CLOSURE AND POST-CLOSURE. THE OCCUPATIONAL HEALTH AND SAFETY ACT WILL BE APPLICABLE FOR THE PROTECTION OF WORKER SAFETY DURING IMPLEMENTATION OF ANY OF THE REMEDIAL ALTERNATIVES. OFFSITE DISPOSAL WOULD HAVE TO MEET HAZARDOUS MATERIALS TRANSPORTATION REGULATIONS. ONSITE LANDFARMING WOULD HAVE TO MEET EMISSIONS STANDARDS. ALTERNATIVES INVOLVING OFFSITE DISPOSAL OF RESIDUAL SLUDGE AND DECONTAMINATION WATER WILL FOLLOW RCRA SUBPART 268 IF TESTING DETERMINES THE WASTE TO BE A RCRA WASTE UNDER RCRA SUBPART 261. OTHERWISE THE WASTE WILL BE SUBJECT TO DELAWARE UST REGULATIONS.

3) LONG-TERM EFFECTIVENESS

THIS CRITERION REFERS TO THE ABILITY OF A REMEDY TO MAINTAIN RELIABLE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER TIME, ONCE CLEANUP GOALS HAVE BEEN MET.

ALTERNATIVES 2, 3, 4 AND 5 WOULD REMOVE/DECONTAMINATE THE ONSITE PIPING/STRUCTURES, ELIMINATING THE FIRE/EXPLOSION THREAT, AND ALSO GREATLY REDUCING THE POSSIBILITY OF LEACHING OF CONTAMINANTS, THEREBY PROVIDING ADEQUATE LONG-TERM PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.

4) REDUCTION OF TOXICITY, MOBILITY, AND VOLUME

THIS CRITERION REFERS TO THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES THAT MAY BE EMPLOYED IN A REMEDY.

THE FOUR ACTION ALTERNATIVES EMPLOY SOME FORM OF TREATMENT OR CONTAINMENT PROCESS TO REDUCE TOXICITY, MOBILITY, AND/OR VOLUME IN THE AFFECTED MEDIA.

SINCE THE PRIMARY EXPOSURE PATHWAY ASSOCIATED WITH SITE FT-3 IS THE THREAT OF FIRE/EXPLOSION TO ONSITE WORKERS, ALTERNATIVES 2, 3, 4, AND 5 WILL ALL REDUCE THIS RISK WITH RESPECT TO THE PRIMARY EXPOSURE PATHWAY.

5) SHORT-TERM EFFECTIVENESS

THIS CRITERION REFERS TO THE PERIOD OF TIME NEEDED TO ACHIEVE PROTECTION, AND ANY ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY BE POSED DURING THE CONSTRUCTION AND IMPLEMENTATION PERIOD UNTIL CLEANUP GOALS ARE ACHIEVED.

ALTERNATIVE 2, 4 AND 5 COULD BE IMPLEMENTED IN A SIMILAR PERIOD OF TIME AND WITHIN A SHORTER PERIOD OF TIME, RESPECTIVELY, THAN ALTERNATIVE 3, THEREBY RESULTING IN REDUCED CONSTRUCTION/IMPLEMENTATION-RELATED IMPACTS. ALTERNATIVES 3 AND 4 WOULD BOTH REQUIRE THE HANDLING OF A LARGE QUANTITY OF EXCAVATED CONTAMINATED SOILS ONSITE, THEREBY EXPOSING SITE WORKERS AND THE PUBLIC TO WASTES TO A GREATER DEGREE THAN WOULD ALTERNATIVE 2 AND 5. IN ADDITION ALTERNATIVE 4 ALSO REQUIRES TRANSPORT OF THESE MATERIALS ON PUBLIC ROADS, WHICH COULD RESULT IN POTENTIAL HUMAN EXPOSURE. THEREFORE, WITH RESPECT TO SHORT-TERM EFFECTIVENESS ALTERNATIVES 2 AND 5 ARE MORE PROTECTIVE THAN ALTERNATIVES 3 AND 4.

6) IMPLEMENTABILITY

THIS CRITERION DESCRIBES THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF A REMEDY, INCLUDING THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT THE CHOSEN SOLUTION.

THE FOUR ACTION ALTERNATIVES ARE TECHNICALLY FEASIBLE. HOWEVER, ALTERNATIVES 2 AND 5 WOULD BE EASIER TO IMPLEMENT THAN ALTERNATIVES 3 AND 4, BECAUSE, ALTERNATIVES 3 AND 4 INCLUDE GREATER MATERIAL HANDLING REQUIREMENTS ASSOCIATED WITH EXCAVATION AND TREATMENT OF SOIL IN ALTERNATIVE 3, AND EXCAVATION, TRANSPORTATION, AND DISPOSAL IN A RCRA LANDFILL IN ALTERNATIVE 4. FURTHERMORE, ALTERNATIVE 4 MAY BE DIFFICULT TO IMPLEMENT BECAUSE OF THE DIFFICULTY IN IDENTIFYING AND SELECTING A RCRA LANDFILL THAT IS WILLING TO ACCEPT THE LARGE QUANTITY OF SOIL TO BE EXCAVATED FROM SITE FT-3. THEREFORE, ALTERNATIVE 4 HAS A DISADVANTAGE OVER ALTERNATIVE 3, WHICH WOULD USE ONSITE TREATMENT.

7) COST

THIS CRITERION ADDRESSES THE CAPITAL FOR MATERIALS, EQUIPMENT, ETC., AND THE O&M COSTS.

ASSUMING A NET PRESENT WORTH (NPW) COST INCLUDING 20 YEARS OF O & M COSTS, ALTERNATIVE 4 WOULD BE THE MOST EXPENSIVE ALTERNATIVE TO IMPLEMENT WITH A NPW COST OF $7,336,300. ALTERNATIVES 2, AND 3 ARE COMPARABLE WITH NPW COSTS OF $1,668,500 AND $1,597,300 RESPECTIVELY. HOWEVER, DUE TO THE RELATIVELY LOW RISK POSED BY SITE SOILS, THIS COST CAN NOT BE JUSTIFIED. ALTERNATIVE 5 HAS A LOW NPW COST OF $100,000 AND REMOVES THE PRIMARY THREAT POSED BY THE SITE. THEREFORE, ALTERNATIVE 5 IS THE MOST COST EFFECTIVE.

THE AIR FORCE HAS SELECTED ALTERNATIVE 5. IT OFFERS THE MOST COST-EFFECTIVE SOLUTION, WHILE STILL PROVIDING ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.

8) SUPPORT AGENCY ACCEPTANCE

THIS CRITERION INDICATES WHETHER, BASED ON THEIR REVIEW OF THE RI, FFS, AND THE PROPOSED RAP, THE SUPPORT AGENCIES CONCUR WITH, OPPOSE, OR HAVE NO COMMENT ON THE PREFERRED ALTERNATIVE.

EPA AND DNREC CONCUR WITH THE SELECTED REMEDY.

9) COMMUNITY ACCEPTANCE

THIS CRITERION ASSESSES THE PUBLIC COMMENTS RECEIVED ON THE RI, FFS, AND THE PROPOSED PLAN.

A PUBLIC MEETING WAS HELD ON AUGUST 30, 1990, AT THE DOVER AIR FORCE BASE OFFICER'S CLUB. THIS MEETING LASTED APPROXIMATELY ONE HOUR, AND THE MEMBERS OF THE PUBLIC IN ATTENDANCE WERE ABLE TO HAVE ALL OF THEIR QUESTIONS ABOUT THE SITE ANSWERED. WRITTEN COMMENTS WERE RECEIVED

DURING THE PUBLIC COMMENT PERIOD. THE MAJOR CONCERNS OF THE COMMUNITY INVOLVE CONTAMINATION FROM OTHER AREAS AT DOVER AFB. THE RESPONSIVENESS SUMMARY, SECTION XI, RESPONDS TO ALL PUBLIC COMMENTS RECEIVED.

#DSR
IX. DESCRIPTION OF THE SELECTED REMEDY

BASED UPON CONSIDERATIONS OF THE REQUIREMENTS OF CERCLA AND ON THE DETAILED EVALUATION OF THE ALTERNATIVES, THE AIR FORCE HAS DETERMINED THAT ALTERNATIVE 5, DECONTAMINATION, REMOVAL AND OFFBASE DISPOSAL OF PIPING/STRUCTURES, SAMPLING SOIL THE AROUND UST, AND A SOIL COVER IS THE MOST APPROPRIATE REMEDY FOR SOIL AND STRUCTURES AT SITE FT-3, DOVER AFB, DELAWARE.

THE UNDERGROUND PIPING WILL REQUIRE REMOVAL WITH A BACKHOE OR OTHER SUITABLE EQUIPMENT PRIOR TO CLEANUP. THE UNDERGROUND STRUCTURES, WHICH INCLUDE AN UST AND OIL/WATER SEPARATOR, WILL BE REMOVED BY MEANS OF A HYDRAULIC BACKHOE OR OTHER SUITABLE EQUIPMENT.

RESIDUAL LIQUID, SLUDGE, AND SOLID MATERIALS WILL BE REMOVED FROM THE PIPING/STRUCTURES AT SITE FT-3 USING PUMPS, MANUAL LABOR, AND OTHER APPROPRIATE MECHANICAL EQUIPMENT. THE LIQUID SLUDGE, AND SOLID MATERIALS WILL BE COLLECTED IN A TANKER TRUCK, 55 GALLON DRUMS, OR OTHER SUITABLE CONTAINERS AND SHIPPED OFFBASE TO A DISPOSAL FACILITY PERMITTED TO TREAT OR DISPOSE OF THE COLLECTED WASTE. ANALYSIS OF THE WASTE MATERIALS WILL BE PERFORMED TO DETERMINE THE DISPOSAL AND/OR TREATMENT REQUIREMENTS. IF, AFTER ANALYSIS, THE WASTE IS DETERMINED TO BE A RCRA HAZARDOUS WASTE, RCRA REGULATIONS FOR DISPOSAL OF LIQUID WASTE WILL BE FOLLOWED. IF, HOWEVER, THE WASTE IS NOT A RCRA HAZARDOUS WASTE, DELAWARE UNDERGROUND STORAGE TANK REGULATIONS FOR DISPOSAL OF THE WASTE WILL BE FOLLOWED.

FOLLOWING REMOVAL OF RESIDUAL MATERIALS, REMAINING CONTAMINATION FROM THE PIPING AND STRUCTURES COULD BE REMOVED USING HIGH-PRESSURE (UP TO 3,000 PSI) AND HIGH-TEMPERATURE STEAM (OR HOT WATER) CLEANING EQUIPMENT IN COMBINATION WITH A SUITABLE CLEANING AGENT. THIS SOLUTION WILL ALSO REQUIRE COLLECTION AND OFFBASE DISPOSAL AND/OR TREATMENT. IF, AFTER ANALYSIS, THE WASTE IS DETERMINED TO BE A RCRA HAZARDOUS WASTE, RCRA REGULATIONS FOR DISPOSAL OF LIQUID WASTE WILL BE FOLLOWED. IF, HOWEVER, THE WASTE IS NOT A RCRA HAZARDOUS WASTE, DELAWARE UNDERGROUND STORAGE TANK REGULATIONS FOR DISPOSAL OF THE WASTE WILL BE FOLLOWED.

THE DECONTAMINATED UST, OIL/WATER SEPARATOR, ABOVEGROUND DUMPSTERS, AND PIPING, WOULD THEN BE DISPOSED OF AT A SANITARY LANDFILL OR SALVAGE YARD. SOILS SURROUNDING THE UNDERGROUND STRUCTURES WILL BE TESTED TO DETERMINE IF CONTAMINATION EXISTS ABOVE ACCEPTABLE RISK BASED LEVELS.

THE EXCAVATED AREAS AT SITE FT-3 WILL BE BACKFILLED AND GRADED AFTER EVALUATION OF SOIL ANALYSIS. A SOIL COVER WILL THEN BE PLACED ON SITE FT-3 AND THE AREA REVEGETATED.

THE RATIONALE FOR SELECTION OF THIS ALTERNATIVE IS BASED ON FOUR PRINCIPLES. FIRST, THE BASELINE RISK ASSESSMENT (BRA) CONDUCTED IN ASSOCIATION WITH THE RI/FFS INDICATES THAT SITE FT-3 APPEARS TO HAVE MINIMAL OR NO IMPACTS ON HUMAN HEALTH AND THE SURROUNDING ENVIRONMENT. EPA'S OWN CALCULATION OF SITE RISKS INDICATE THAT HUMAN HEALTH RISKS FROM EXPOSURE TO CONTAMINATED SOILS AT SITE FT-3 ARE WELL BELOW THE EPA TARGET CANCER RISK RANGE OF (10-4) TO (10-6), AND THAT THE SOIL AT SITE FT-3 IS HAVING A MINIMAL EFFECT ON GROUNDWATER IN THE AREA. SECOND, BY REMOVAL OF THE SITE PIPING/STRUCTURES AND RESIDUAL WASTE FUEL/OIL IN THE PIPING/STRUCTURES THE MAJOR KNOWN AND POTENTIAL SOURCES OF FIRE AND EXPLOSION THREAT ASSOCIATED WITH SITE FT-3 ARE REMOVED. THIRD, THERE IS

CURRENTLY NO INDICATION THAT SITE SOIL CONTAMINANTS ARE MIGRATING OFF BASE VIA NEARBY SURFACE WATER AND/OR SEDIMENT PATHWAYS, AND THE LIMITED GROUNDWATER CONTAMINATION IN THE VICINITY OF SITE FT-3 ORIGINATES FROM SOURCES UPGRADIENT OF THE SITE. FINALLY, THE BASE-WIDE GROUNDWATER MONITORING STUDY FOR DOVER AFB WILL SERVE TO IDENTIFY FUTURE MIGRATION (IF ANY) OF SITE FT-3 CONTAMINANTS IN GROUNDWATER AND SURFACE WATER AND DETERMINE THE NEED (IF ANY) FOR FUTURE ADDITIONAL MONITORING OR REMEDIAL ACTIONS AT SITE FT-3.

IN ADDITION, PURSUANT TO SECTION 120(H) OF CERCLA, 42 USC. SECTION 9620(H), APPROPRIATE NOTICE REGARDING HAZARDOUS SUBSTANCE ACTIVITY MUST BE GIVEN IF THE AIR FORCE TRANSFERS LAND AT THE SITE.

COST ESTIMATE FOR ALTERNATIVE 5

COST ITEM	
REMOVE AND DISPOSE OF PIPING/STRUCTURES	$ 25,000
REMOVE AND DISPOSE OF RESIDUAL MATERIAL AND DECONTAMINATION OF PIPING/STRUCTURES	$ 45,000
SAMPLING AND ANALYSIS OF SOIL AROUND UST	$ 10,000
BACKFILL STRUCTURES AND SOIL COVER AND RESEEDING	$ 15,000
TOTAL O&M COST INCLUDING GRASS CUTTING (ADJUSTEDNET PRESENT WORTH VALUE)	$ 5,000
TOTAL COST	$100,000

#SD
X. STATUTORY DETERMINATIONS

THE AIR FORCE'S PRIMARY RESPONSIBILITY AT DOVER AFB IS TO IMPLEMENT REMEDIAL ACTIONS THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. SECTION 121 OF CERCLA, 42 USC SECTION 9621, ALSO ESTABLISHES SEVERAL OTHER STATUTORY REQUIREMENTS AND PREFERENCES. THE SELECTED REMEDY MUST BE COST EFFECTIVE AND UTILIZE A PERMANENT SOLUTION TO THE MAXIMUM EXTENT PRACTICABLE. THE SELECTED REMEDIAL ACTION MUST COMPLY WITH ALL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS SET FORTH BY STATE AND FEDERAL ENVIRONMENTAL REGULATIONS, UNLESS SUCH REQUIREMENTS ARE WAIVED IN ACCORDANCE WITH CERCLA SECTION 121, 42 USC SECTION 9621. FINALLY, THE AIR FORCE MUST CONSIDER THE STATUTORY PREFERENCE FOR REMEDIAL ACTIONS THAT PERMANENTLY REDUCE THE TOXICITY, MOBILITY, AND VOLUME OF THE SITE-RELATED WASTES. THE FOLLOWING SECTIONS DISCUSS HOW THE SELECTED REMEDY MEETS THE STATUTORY REQUIREMENTS AND PREFERENCES SET FORTH BY SECTION 121 OF CERCLA.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE RISK POSED BY THE SITE WAS IDENTIFIED AS THE FIRE AND EXPLOSION THREAT FROM THE SITE STRUCTURES. THIS IS THE ONLY SIGNIFICANT EXPOSURE PATHWAY HAVING AN ADVERSE EFFECT ON HUMAN HEALTH AND THE ENVIRONMENT. THE SELECTED REMEDY WOULD PROTECT HUMAN HEALTH AND THE ENVIRONMENT BY ELIMINATING THE FIRE AND EXPLOSION THREAT BY REMOVAL OF THE SITE STRUCTURES. ADDITIONALLY, IMPLEMENTATION OF THIS ALTERNATIVE IS NOT ANTICIPATED TO RESULT IN ANY ADVERSE SHORT-TERM RISKS OR CROSS-MEDIA IMPACTS.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

THE SELECTED REMEDIAL ACTION WILL COMPLY WITH ALL APPLICABLE OR RELEVANT AND APPROPRIATE LOCATION-, ACTION-, AND CHEMICAL-SPECIFIC REQUIREMENTS (ARARS). A COMPLETE LISTING OF ARARS DEVELOPED DURING THE COMPARATIVE ANALYSIS OF ALTERNATIVES IS PRESENTED IN TABLE 5, THE ARARS SPECIFIC TO THE SELECTED REMEDY ARE PRESENTED BELOW.

* CHEMICAL-SPECIFIC ARARS:
- NONE

* LOCATION-SPECIFIC ARARS:
- 40 CFR PART 6 - FLOOD PLAIN AND WILDLIFE PROTECTION REGULATIONS ARE APPLICABLE FOR REMEDIAL ACTIONS IN A FLOODPLAIN.

* ACTION-SPECIFIC ARARS:
- 40 CFR PART 50 - NATIONAL AMBIENT AIR REGULATIONS FOR AIR AND DUST EMISSIONS FROM REMEDIAL ACTIONS.

- 29 CFR PART 1910 - OCCUPATIONAL AND WORKER SAFETY AT REMEDIAL ACTION SITES.

- DEL. CODE, TITLE 7, CHAPTER 161 UNDERGROUND STORAGE TANK REGULATIONS ESTABLISHING GUIDELINES FOR CLEANUP OF UST.

- 40 CFR PART 268 - RCRA GUIDELINES FOR DISPOSAL OF RCRA HAZARDOUS WASTE.

- 49 CFR PARTS 170-179 - US DEPARTMENT OF TRANSPORTATION REGULATIONS GOVERNING TRANSPORTATION OF CONTAMINATED WASTES.

COST-EFFECTIVENESS

THE SELECTED REMEDY PROVIDES A LEVEL OF PROTECTION OF HUMAN HEALTH COMPARABLE TO THAT PROVIDED BY THE OTHER REMEDIES, BUT AT A SIGNIFICANTLY REDUCED COST.

THE ESTIMATED TOTAL COST IS $100,000 WHICH INCLUDES A NET PRESENT WORTH COST ACCOUNTING FOR 20 YEARS OF OPERATION AND MAINTENANCE AT THE SITE. THE O&M ACTIVITY IS EXPECTED TO INCLUDE CUTTING THE GRASS AND MAINTAINING VEGETATION AT THE SITE.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT (OR RESOURCE RECOVERY) TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE (MEP).

THE AIR FORCE HAS DETERMINED THAT THE SELECTED REMEDY REPRESENTS THE MAXIMUM EXTENT TO WHICH PERMANENT TREATMENT TECHNOLOGIES CAN BE UTILIZED IN A COST EFFECTIVE MANNER FOR SITE FT-3. OF THOSE ALTERNATIVES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND COMPLY WITH ARARS, THE AIR FORCE HAS DETERMINED THAT THE SELECTED REMEDY PROVIDES THE BEST BALANCE IN TERMS OF SHORT-TERM EFFECTIVENESS; IMPLEMENTABILITY; COST; REDUCTION IN TOXICITY, MOBILITY, AND VOLUME; AND LONG-TERM EFFECTIVENESS.

DUE TO THE RELATIVELY LOW RISK ASSOCIATED WITH THE SITE, THE AIR FORCE HAS DETERMINED THAT THE USE OF A MORE COSTLY TREATMENT TECHNOLOGY AT SITE FT-3 IS NOT JUSTIFIABLE. BECAUSE ALL THE REMEDIAL ALTERNATIVES WITH THE EXCEPTION OF ALTERNATIVE 1, OFFER A COMPARABLE LEVEL OF PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT, THE AIR FORCE HAS SELECTED ALTERNATIVE 5, WHICH CAN BE IMPLEMENTED QUICKLY; WILL HAVE LITTLE OR NO ADVERSE EFFECTS ON THE SURROUNDING COMMUNITY; AND WILL COST

CONSIDERABLY LESS THAN THE OTHER ALTERNATIVES.

PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT.

THE STATUTORY PREFERENCE FOR REMEDIAL ALTERNATIVES THAT EMPLOY TREATMENT AS THE PRINCIPLE ELEMENT WILL BE MET WITH THE IMPLEMENTATION OF THE SELECTED REMEDY. THE PRINCIPLE THREAT WILL BE ELIMINATED BY TREATMENT OF THE SITE STRUCTURES.

DOCUMENTATION OF SIGNIFICANT CHANGES

THE PREFERRED ALTERNATIVE ORIGINALLY SELECTED IN THE PROPOSED RAP IS ALSO THE PREFERRED ALTERNATIVE IDENTIFIED IN THE ROD.

#RS
XI. RESPONSIVENESS SUMMARY

FIRE TRAINING AREA 3, DOVER AIR FORCE BASE
KENT COUNTY, DELAWARE

SEPTEMBER 1990

THIS COMMUNITY RELATIONS RESPONSIVENESS SUMMARY IS DIVIDED INTO THE FOLLOWING FOUR SECTIONS:

OVERVIEW: A DESCRIPTION OF THE SELECTED REMEDY AND COMMUNITY REACTION TO THE SELECTED REMEDY.

BACKGROUND OF COMMUNITY INVOLVEMENT AND CONCERNS: A BRIEF HISTORY OF COMMUNITY INTEREST IN FIRE TRAINING AREA-3 AND DOVER AFB.

SUMMARY OF PUBLIC COMMENTS AND AIR FORCE RESPONSES: REPLIES TO PUBLIC COMMENTS.

REMEDIAL DESIGN/REMEDIAL ACTION CONCERNS: DISCUSSION OF PUBLIC CONCERNS WHICH HAVE A BEARING ON THE REMEDIAL ACTION.

OVERVIEW

THE RI AND FFS REPORTS AND THE PROPOSED RAP FOR SITE FT-3 WERE RELEASED TO THE PUBLIC FOR REVIEW AND COMMENT ON AUGUST 14, 1990. THIS DATE MARKED THE OPENING OF THE PUBLIC COMMENT PERIOD ON THE ALTERNATIVES DETAILED IN THE PROPOSED RAP. A PUBLIC NOTICE WAS PUBLISHED ON AUGUST 14, 1990, WHICH IDENTIFIED ALTERNATIVE 5 AS THE PREFERRED REMEDIAL ALTERNATIVE FOR SITE FT-3. ALTERNATIVE 5 INCLUDES DECONTAMINATION, REMOVAL, AND OFFBASE DISPOSAL OF THE SITE FT-3 PIPING/STRUCTURES; SOIL SAMPLING AROUND THE UST; PROVIDING A SOIL COVER OVER THE SITE; AND REVEGETATION OF THE SITE. A DETAILED DESCRIPTION OF THE DECONTAMINATION, REMOVAL, AND DISPOSAL PROCESS FOR THE SITE PIPING/STRUCTURES IS PROVIDED IN SECTION 4 OF THE FFS.

THE LIMITED COMMENTS RECEIVED FROM THE PUBLIC SUGGEST THAT AREA RESIDENTS DO NOT OBJECT TO THE PREFERRED ALTERNATIVE. HOWEVER, THERE IS CONCERN THAT THE PREFERRED REMEDIAL ACTION DOES NOT ADDRESS THE POSSIBILITY OF CONTAMINATED GROUNDWATER OR SURFACE WATER MIGRATING OFFSITE. THE AIR FORCE CONDUCTS QUARTERLY MONITORING OF SURFACE WATER AND IS CONTINUING AN INVESTIGATION OF BASEWIDE GROUNDWATER TO ADDRESS THIS CONCERN.

BACKGROUND OF COMMUNITY INVOLVEMENT AND CONCERNS

SITE FT-3 WAS A FIRE TRAINING SITE COVERING APPROXIMATELY 1.3 ACRES AND

WAS USED FROM 1962 UNTIL MAY 1989. OFF-SPECIFICATION JET FUEL (JP-4) AND USED MOTOR OIL WAS SPREAD IN A WATER-SATURATED PIT, IGNITED, AND THEN EXTINGUISHED.

IN 1982, THE UNITED STATES DEPARTMENT OF DEFENSE (DOD) IMPLEMENTED THE INSTALLATION RESTORATION PROGRAM (IRP) TO IDENTIFY AND EVALUATE ENVIRONMENTAL CONTAMINATION AND ASSOCIATED PUBLIC HEALTH HAZARDS AT DOD FACILITIES RESULTING FROM PAST OPERATIONS AND WASTE HANDLING/DISPOSAL. AN INSTALLATION ASSESSMENT (PHASE I-RECORDS SEARCH) WAS COMPLETED FROM DOVER AFB IN 1983. THIS STUDY INDICATED A POTENTIAL FOR CONTAMINATION FROM PAST AND/OR CURRENT FACILITY OPERATIONS AT A NUMBER OF SITES, INCLUDING SITE FT-3. TWO SUCCESSIVE RI STUDIES WERE COMPLETED IN 1986 AND 1989. THESE RIS CONFIRMED THE PRESENCE OF CONTAMINATION IN THE SOIL AND GROUNDWATER. AN FFS WAS COMPLETED IN AUGUST 1990. THIS FFS INCLUDED DEVELOPMENT OF A BRA, REMEDIAL ACTION ALTERNATIVES, AND A DISCUSSION OF COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS). A PROPOSED RAP WAS ALSO DEVELOPED IN AUGUST 1990, WHICH RECOMMENDED SELECTION OF ALTERNATIVE 5. IN ADDITION, A PUBLIC MEETING WAS CONDUCTED ON AUGUST 30, 1990, AND A PUBLIC COMMENT PERIOD WAS HELD FROM AUGUST 14 TO SEPTEMBER 27, 1990.

THE PUBLIC AFFAIRS OFFICE AT DOVER AFB ISSUES PRESS RELEASES DETAILING IRP PROGRESS. COVERAGE IN THE TWO DAILY NEWSPAPERS SERVING THE DOVER AREA HAS USUALLY BEEN FRONT PAGE, BUT THE ISSUES TEND TO DISSIPATE WITHIN A FEW DAYS BECAUSE OF A RELATIVELY LOW LEVEL OF COMMUNITY CONCERN. THE START OF REMEDIAL ACTIVITIES AT DOVER AFB COULD INCREASE COMMUNITY CONCERN.

SUMMARY OF PUBLIC COMMENTS AND AIR FORCE RESPONSES

THE MAJORITY OF THE WRITTEN AND ORAL COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD REVOLVED AROUND SURFACE WATER AND GROUNDWATER CONDITIONS AT DOVER AFB.

1. ONE COMMENTOR ASKED IF SURFACE WATER HAD BEEN MONITORED AT DOVER AFB AT ALL IN THE PAST.

AIR FORCE RESPONSE: SURFACE WATER IS ANALYZED ON A QUARTERLY BASIS AT THE TWO MAJOR STORM DRAINAGE OUTFALLS. ONE OF THE OUTFALLS IS ON THE SOUTHWEST SIDE OF THE BASE, ADJACENT TO THE GOLF COURSE AND NEAR THE ST. JONES RIVER. THE OTHER IS LOCATED VERY NEAR SITE FT-3 IN THE PIPE ELM BRACH, WHICH FLOWS INTO THE LITTLE CREEK. IN ADDITION, SITE SPECIFIC SURFACE WATER SAMPLES WERE TAKEN DURING THE TWO SAIC STUDIES. THE ANALYTICAL EVIDENCE SUGGESTS THE SURFACE WATER DOES NOT POSE A THREAT TO HUMAN HEALTH OR THE ENVIRONMENT.

2. A COMMENTOR ASKED IF GROUNDWATER STUDIES HAD BEEN CONDUCTED.

AIR FORCE RESPONSE: GROUNDWATER STUDIES HAVE BEEN CONDUCTED, HOWEVER, THE GEOLOGY IN CONJUNCTION WITH PAST WASTES SITES IS VERY COMPLEX AND HAS NOT YIELDED A COMPLETE PICTURE OF GROUNDWATER MIGRATION. FOR THIS REASON, ADDITIONAL STUDY IS REQUIRED. THIS ROD ONLY ADDRESSES SOIL. IT DOES NOT ADDRESS GROUNDWATER OR SURFACE WATER.

3. A COMMENTOR ASKED ABOUT THE STATED PROBLEM FOR SITE FT-3 BEING FIRE AND EXPLOSION AND ASKED WHY EPA WAS INVOLVED.

EPA/AIR FORCE RESPONSE: A THREE-PART FEDERAL FACILITY AGREEMENT WAS SIGNED WHICH REQUIRES REMEDIATION OF MANY SITES ON DOVER AFB. FT-3 WAS ONE OF THESE SITES. AT THE TIME FT-3 WAS INCLUDED IN THE AGREEMENT, WE THOUGHT THERE WAS A SOIL PROBLEM THERE. AFTER REVIEWING THE DATA, WE FOUND THAT THE ANALYSIS OF THE SOIL INDICATES CONTAMINANT LEVELS ARE WELL BELOW THE ALLOWABLE LEVELS CALCULATED TO BE PROTECTIVE OF HUMAN

HEALTH AND THE ENVIRONMENT.

REMEDIAL DESIGN/REMEDIAL ACTION CONCERNS

THE ONLY COMMENT REGARDING IMPLEMENTATION OF THE REMEDIAL ACTION WAS ABOUT HOW CONTAMINATION RESULTING FROM CONSTRUCTION COULD BE CONTAINED ON DOVER AFB.

AIR FORCE RESPONSE: SOIL WILL HAVE WATER APPLIED TO IT BEFORE EXCAVATION TO MINIMIZE DUST. IN ADDITION, A SILT FENCE WILL BE INSTALLED AROUND THE CONSTRUCTION AREA TO MINIMIZE EROSION. AN ABSORBENT BOOM WILL ALSO BE MAINTAINED IN THE DRAINAGE CHANNEL IN THE EVENT A CONTAMINANT WAS TO BYPASS THE OTHER CONTAINMENT MEASURES.

#TA

TABLE 2

CONTAMINATION DETECTED AT SITE FT-3

DETECTED CONTAMINANT	MINIMUM CONCENTRATION	MAXIMUM CONCENTRATION	DETECTION FREQUENCY
SOIL (PARTS PER MILLION)			
TRICHLOROETHANE	0.0032	0.009	2/57
TETRACHLOROETHANE	0.041	0.041	1/57
2-BUTANONE	0.032	0.34	2/56
BENZENE	0.014	0.014	1/57
TOLUENE	0.027	28	3/57
XYLENE	0.015	19	4/57
ETHYL BENZENE	0.008	8.7	4/57
1,1-DICHLOROETHANE	0.008	0.008	1/57
1,2-DICHLOROETHANE	0.59	0.59	1/57
LEAD	1.1	200	54/54
TPH	120	4,000	10/47
GROUNDWATER (PARTS PER BILLION)			
VINYL CHLORIDE	6.9	6.9	1/7
TETRACHLOROETHANE	0.3	0.3	1/7
TOLUENE	0.4	0.4	1/7

TABLE 3

ENVIRONMENTAL FATE AND TRANSPORT OF
CONTAMINANTS OF CONCERN AT SITE FT-3

CONTAMINANTS OF CONCERN	SORPTION	BIODEGRADATION
BENZENE	MODERATELY MOBILE IN SOIL	DEGRADES SLOWLY UNDER AN AEROBIC ENVIRONMENT, BUT IS CONSIDERED PERSISTENT IN SOILS SUFFICIENTLY DEEP TO BE DEPLETED OF OXYGEN.
TOLUENE	MODERATELY MOBILE IN SOIL.	EASILY DEGRADED IN AN AEROBIC ENVIRONMENT, BUT MUCH SLOWER DEGRADATION IS POSSIBLE IN AN ANAEROBIC AQUIFER.
XYLENE	MODERATELY MOBILE IN SOIL.	DEGRADED UNDER AEROBIC CONDITIONS BUT PERSISTENT IN AN ANAEROBIC AQUIFER.
ETHYLBENZENE	SLIGHTLY MOBILE SOIL.	RAPID DEGRADATION OCCURS IN AEROBIC ENVIRONMENTS, BUT THIS PROCESS DOES NOT IN ANAEROBIC AQUIFERS.
LEAD	SLIGHTLY MOBILE SOIL.	BIODEGRADATION OF LEAD IS NOT IN SIGNIFICANT.
PETROLEUM HYDROCARBONS	MODERATELY MOBILE IN SOIL.	DEGRADES UNDER AEROBIC CONDITIONS

TABLE 3 (CONT'D)

CONTAMINANTS OF CONCERN	PRINCIPLE ENVIRONMENTAL FATE
BENZENE	PRINCIPLE FATE IS VOLATILIZATION AND DESTRUCTION IN THE ATMOSPHERE, BUT CAN ALSO BE LEACHED INTO THE GROUNDWATER.
TOLUENE	PRINCIPLE FATE IN SURFICIAL SOIL OR WATER IS VOLATILIZATION AND DESTRUCTION IN THE ATMOSPHERE, BUT BIODEGRADATION AND LEACHING INTO GROUNDWATER CAN CONTRIBUTE TO ENVIRONMENTAL DEGRADATION.
XYLENE	SEE PRINCIPLE FATE OF BENZENE.
ETHYLBENZENE	PRINCIPLE FATE IS VOLATILIZATION FOLLOWED BY DESTRUCTION IN THE ATMOSPHERE; HOWEVER, LEACHING INTO GROUNDWATER MAY ALSO OCCUR.
LEAD	PRINCIPLE FATE IS ADSORPTION TO SOIL.
PETROLEUM HYDROCARBONS.	SEE PRINCIPLE FATE OF BENZENE.

TABLE 4

CANCER POTENCY FACTORS AND REFERENCE DOSES
USED IN SITE FT-3 RISK CHARACTERIZATION

CONTAMINANT OF CONCERN	CPF ((MG/KG/DAY)-1}(A)		RFD (MG/KG/DAY)(B)	
	ORAL	INHALATION	ORAL	INHALATION
BENZENE	.0029	.0029		
TOLUENE			.3	2.0
XYLENE			2.0	.3
ETHYL BENZENE			.1	.1
LEAD			NA(C)	
TPH			NA(D)	

(A) CANCER POTENCY FACTOR FOR CARCINOGENIC EFFECTS.

(B) REFERENCE DOSE FOR NONCARCINOGENIC EFFECTS.

(C) EPA REFERENCE DOSE FOR LEAD HAS BEEN WITHDRAWN. ACCEPTABLE SOIL LEVELS ARE CALCULATED USING THE EPA BIOGENETIC MODEL ON A SITE-SPECIFIC BASIS. TYPICAL SOIL CLEANUP LEVELS FOR RESIDENTIAL AREAS ARE IN THE RANGE OF 200 PPM LEAD.

(D) CLEANUP LEVELS IN SOIL FOR TPH ARE BASED ON THE RISK TO HUMAN HEALTH AND THE ENVIRONMENT FROM CARCINOGENIC COMPOUNDS, SUCH AS BENZENE, THE NON-CARCINOGENIC EFFECT FROM COMPOUND, SUCH AS TOLUENE, AND USE OF THE AREA, (I.E. RESIDENTIAL, NON-RESIDENTIAL) ON A SITE-SPECIFIC BASIS. LEVELS FOR TPH IN SOIL AT FT-3, (NON-RESIDENTIAL, RESTRICTED ACCESS), WERE BASED ON THE RISK POSED TO WORKERS FROM THESE COMPOUNDS

TABLE 5

ARARS

STANDARD, REQUIREMENT, CRITERIA, OR LIMITATION	CITATION	RETAINED DISCUSSION
SUBTITLE D LAND DISPOSAL	(40 CFR PART 257)	YES
SUBTITLE C LANDFILL CLOSURE AND POST CLOSURE	(40 CFR PART 264)	YES
LAND DISPOSAL RESTRICTIONS	(40 CFR PART 268)	YES
THERMAL TREATMENT	(40 CFR PART 240)	NO
NPDES REQUIREMENTS	(40 CFR PARTS 122-124)	NO
NATIONAL AMBIENT AIR STANDARDS	(40 CFR PART 50)	YES
OCCUPATIONAL SAFETY AND ADMINISTRATION REQUIREMENTS	(29 CFR PART 1910)	YES
US DEPARTMENT OF TRANSPORTATION REGULATIONS	(49 CFR PARTS 170-179)	YES
CONSERVATION OF WILDLIFE COORDINATION ACT)	(FISH & WILDLIFE	NO
FLOOD PLAIN AND WILDLIFE PROTECTION	(40 CFR PART 6)	YES
UNDERGROUND STORAGE TANK REGULATIONS	(DEL CODE, TITLE 7, CHAPTER 161)	YES

TABLE 5 (CONT'D)

	DISCUSSION
SUBTITLE D LAND DISPOSAL CRITERIA	ESTABLISHES CRITERIA FOR SOLID WASTE DISPOSAL FACILITIES.
SUBTITLE C LANDFILL CLOSURE AND POST-CLOSURE	RCRA REGULATIONS FOR LANDFILL CLOSURE AND POST-CLOSURE.
LAND DISPOSAL RESTRICTIONS	RESTRICTS LAND DISPOSAL OF CONTAMINATED SOIL.
THERMAL TREATMENT	GUIDELINES FOR INCINERATION OF WASTE.
NPDES REQUIREMENTS	REGULATES DISCHARGES TO SURFACE WATER.
NATIONAL AMBIENT AIR QUALITY STANDARD.	REGULATES EMISSION FROM REMEDIAL ACTIONS.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REQUIREMENTS	WORKER SAFETY AT REMEDIAL ACTION SITES.
US DEPARTMENT OF TRANSPORTATION REGULATIONS	REGULATIONS GOVERNING TRANSPORTATION OF CONTAMINATED SOILS AND WASTES.
CONSERVATION OF WILDLIFE RESOURCES	PROTECTION OF ENDANGERED SPECIES.
FLOOD PLAIN AND WILDLIFE PROTECTION	REGULATES REMEDIAL ACTIONS IN FLOODPLAIN AND WETLANDS.